Master's Thesis in Education

Exploring Science Classroom Culture in Indonesia from the Perspective of 'Community of Practice'

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Abstract

This study discusses the findings about science classroom culture in Indonesia. It employs sociocultural theory as a lens for identifying the structures that influence science learning in a cultural context. According to Wenger's (1998) theory, 'Community of Practice' (CoP) is a group of people who share concerns, a set of problems, and knowledge. In a science class, most of the inquiry processes are practised as small group activities and include social attributes. The CoP is thus expected to present a perspective about science classroom culture. The findings from existing studies suggest that several instruments of classroom environment show the significant differences regarding students' perception of classroom environment in Indonesia from different groups of students. Moreover, PISA and TIMSS results report that Indonesian students show a high-index of motivation, good engagement, and the highest sense of school belonging. However, Indonesia usually shows very low, often the lowest, result in terms of academic performances.

These disparities deserve some qualified explanations and in-depth investigations. In order to understand the phenomena and their backgrounds, this study will investigate classroom culture by employing five structural elements of SCaCoP (Science Classroom as Community of Practice) for exploring science classroom culture (i.e., Responsibility for Learning, Common Interest, Mutual Relationship, Open Participation, and Practice) to

survey 1660 Indonesian high and middle school students. The results reveal that Indonesian students achieved high scores relatively for Responsibility, Open Participation, Relationship, and Practice elements, while Common Interest was performed as the lowest score. In addition, there were some significant differences based on genders, grades, and school localities in SCaCoP results.

These quantitative results were confirmed by qualitative analysis in which the data were triangulated through observation of four representative classes and interviews with twelve selected students and four science teachers. The qualitative results show that the students' understanding of the important aspect (i.e., responsibility, main domain, and the rules) related to science lesson encouraged them to become responsible and to be serious in learning science. However, some topics of science were considered difficult by students, and teachers failed to deliver an effective lesson, making students less interested in learning science. The academic performance of Indonesian students is still lower than other countries. Notwithstanding the low interest, Mutual Relationship and Open Participation of students were perceived high in the classroom. Friendliness and sharing data were found from the interview that would make Indonesian students good at relationship. Furthermore, open adjustment, open communication, and common participation were supposed to influence a higher score of Open Participation by Indonesian students in learning science. In short, Indonesian students had a good engagement in shared activities that would

make students feel helpful and enjoy the learning. Lastly, Indonesian students were good at deciding and evaluating any rules of a science lesson, but they thought that they need to be more productive in practice. Educational implications were discussed in terms of social views on learning as well as their impact on teaching and learning science.

Keyword: Community of Practice, science classroom culture, Indonesia secondary school
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Chapter 1. Introduction

1.1. Background

Many studies have documented the promising findings of learning through social interactions that can improve individual development. Cognitive development does not take place in individuals' minds, but it is situated in the social interactions and the culture they live (Vygotsky, 1978; Lave & Wanger, 1991). However, these social views on learning do not ignore the individual cognitive process itself, but it realizes the internalization of knowledge from individual to social context and vice versa. The process of internalization (Vygotsky, 1978) is where individual knowledge becomes appropriate and useful for others. Therefore, this socially shared cognition through social interaction makes a greater possible opportunity for an individual to think constructively through transformations of understanding, identity, and knowledgeable skill from others

In the school, a classroom consisting of many students would inevitably mediate the social interaction among students, particularly during the lesson. In the science classroom, laboratory activities and group observation could be one of the socially shared activities by groups of students. Through this learning, each member of the group might give different ideas or responses, and those will be collectively constructed to arrive at one final product. That is to assume that this group is a kind of

scientific community who, in one way or another, share their knowledge for a single purpose (i.e., gaining a science concept as a product), then, so-called 'Community of Practice (CoP)' (Lave & Wenger, 1991). Furthermore, in that process of achieving one goal, the social process by members of community naturally influence their learning processes and outcomes (Vygotsky, 1978). All things considered, to understand what and how students learn in a community, it is essential to investigate the sociocultural context where learning takes place as well as their impact on learning.

Basically, sociocultural perspective proposes viewing science and education as human social activities within the community and cultural framework. The variety of sociocultural factors in the learning process by groups in a classroom are recognized, discussed and sometimes statistically tested (Hofstede, 1986; Lemke, 1990; Fraser, 1998, 2002). How students learn in a group depends on the particular culture of that group. Each group behaviour can be predicted from personal needs, role expectation, and classroom environment (Getzels & Thelen, 1972). Furthermore, Lipham and Hoy Miskel (1985) claim that to some extent the role expectation and individual needs-disposition had the source and related to the culture in which this system operates. By studying the socio-cultural dimension of a group in a science class, we can set insights into the different ways through which culture influences science teaching and learning. Culture here can be understood as science culture, classroom culture, or even the country's culture itself. The structure of a classroom is not constructed by only the

teacher in the classroom, but also by the students. It is evident, then, that classrooms are social fields in which teacher and student enact culture as practices. However, in the inquiry process, science learning is mostly organized into student-centred learning where students dominantly enact their community cultures. Thus, firstly, it is important to identify how student perceives their classroom culture and which factors are related to the students' perceptions. Secondly, teachers' perception will be gathered as well to portray more accurate picture in addition to students' perception.

Recent socio-cultural studies about student perceptions of a science classroom climate have been researched in different parts of the world. The findings create significant differences in some structures between different groups of students (e.g. country, school's locality, gender, and grade) and reflect the students' outcomes (Fraser, 1998, 2002; Aldridge & Fraser, 2000; Wahyudi &Treagust, 2004; Kim et al., 2000). Moreover, the previous International surveys in science education (e.g. PISA and TIMSS) reported that Indonesian students perform a high-index of motivation and engagement in learning science. For example, TIMSS 2015 measuring fourth-grade class reports that Indonesia is the first place of a high sense of school belonging and 66% of the students reported that they interested in learning science. However, Indonesia usually shows very low, often the lowest results in academic performance in science and beliefs about the nature and origin of scientific knowledge. (OECD, 2016; TIMSS&PIRLS, 2016). These findings from Indonesia data in PISA & TIMSS provide

disparities that contrast with the educational theories where good climates in a classroom are supposed to improve their academic performances. Students in Indonesia reported a more positive disciplinary climate in science lesson than on average across OECD countries, while their academic performances were below average.

1.2. Purpose of Research

The disparities that found from the existing studies deserve qualified explanations and further investigations. In order to understand the phenomena and backgrounds, classroom culture needs to be investigated. We employed multiple research methods for collecting the accurate data to examine the classroom culture suggested by students and teachers as a "community of practice (CoP)" in the science learning. More specifically, this research is designed to answer the following research questions:

1. What features of science classroom culture exist in Indonesia?
2. Are there differences between different groups of students' perceptions of their science classroom culture?
3. Are there differences between students' and teachers' perceptions of their science classroom culture?
4. What structures could be the crucial contributors in order to improve happiness or enjoyment and might also students' performances?

The findings of this study could be significant since critical feedback to Indonesia may also reveal useful information for international science

education researchers that are interested in socio-cultural issues. In particular, by viewing learning as a social practice rather than as individual pursuits may bring some implications for better approaches to classroom change in science learning. Aside from centralizing efforts of increasing students' test scores, more attention should also be paid to transforming the culture of the classroom to enhance students' opportunities for having meaningful participation and interaction surrounding their science learning.

1.3. Scope of this Study

Since this study explores the science classroom culture using multiple research methods, the context and participants should be carefully categorized in order to portray the patterns of science classroom culture in Indonesian. Nevertheless, this study could not become a large-scale of national study. Therefore, this study was set with some limits through purposive sampling method based on clusters to be considered as representative of Indonesia as possible. Here is the following variable categorizes this study:

1. *The Grade of samples*. This study examines the science classroom culture in the secondary schools. Middle and high school students were involved in participating in this study. Furthermore, from the middle school grades, this study focused on year 8^{th} students considering their abilities to answer all the questions about classroom culture. Also, the 9^{th}grade students were preparing to have a national exam. On the other

hand, samples from high school students were decided to involve the grade 10th students because of the selection of majors is done since the first year of high school period.

2. *Mixed-genders in the classroom*. The gender aspect was considered as one of the cultural dimensions of Hofstede's theory. Genders in the representative classroom should be varied, so this study avoided to take the data from single-sex classes.
3. *Urban-Suburban localities.* This study was conducted in the two types of inhabit based on location. Urban and suburban were selected since the lifestyle looks very close to each other, but both are in the different areas. However, for the future plan, this study will also address to the rural areas.
4. *The most representative area of Indonesia.* Despite Indonesia consists of 34 provinces and 18.000 islands, just one province was decided as the most representative areas of whole Indonesia.
5. *Culture dimensions based on CoP's elements.* As the science classroom culture was suggested by members of CoP (i.e., students and teachers), this study focused on the CoP's elements that initially coined by Lave & Wenger (1998) and recently expanded to be SCaCoP elements (Chun et al., 2015).

1.4. Summary of Study Design

The data of this study was obtained using mixed-methods, quantitative and qualitative approach. In the first stage, a preliminary analysis of previous literature about the picture of classroom environment and culture in Indonesia and how it measured was examined. Several disparities and limitations from the previous study need some qualified explanations and in-depth investigation. In order to do an investigation, this study categorized what kind of instrument, research method, and samples' criteria. Then, this study was decided to use five elements of SCaCoP, the last project by Education of Physics in Context (EPIC) lab group at Seoul National University in order to develop new cultural dimensions based on CoP theory, to explore the patterns of Science Classroom Culture suggested by students' and teachers' as CoP. Both quantitative and qualitative followed these elements as a standard.

The quantitative phase employed a questionnaire called SCaCoP to examine science classroom culture suggested by only students. This is an initial exploratory quantitative phase aimed at eliciting students' perspective. The data come from different groups of students, and they were analyzed statistically by comparison methods. The results of this phase draw the Indonesians' trends based on five cultural elements.

Hereafter, quantitative would be confirmed by qualitative analysis as a way of triangulating the data to portray a more accurate picture of this research. The qualitative data was gathered through classroom observations

and interviews with whom participated in the SCaCoP survey. Video recording and field notes were employed during classroom observation. This stage used the standard behaviour and conversation that categorizes the SCaCoP elements (see Table 3.4) as a way of coding the students' activities in learning science. These classroom observation results were drawn based on the researcher perspectives which structures during science lesson in the video that fit SCaCoP elements. Furthermore, interview sections involved students and teachers who participated in the classroom observation. The questions investigated the cultural structures in-depth by SCaCoP and what structures of SCaCoP could be the crucial contributors in order to improve happiness or enjoyment and might also students' performances. Thus, it might provide the several implications beyond the SCaCoP elements.

Chapter 2. Theoretical Framework and Literature Review

In this section, the concept of Community of Practice (CoP) are introduced firstly, and then its expanded concept called Science Classroom as Community of Practice (SCaCoP) as the main structure for this study are explained further. Specifically, the five structural elements of SCaCoP are described per item to make clear how these elements are possible to be assessed for Indonesian science classroom. In doing so, an overview of the latest version of Indonesian curriculum of science is briefly explained as well.

2.1. The notion of 'Community of Practice'

This exploratory study based on Wenger's theory of 'Community of Practice' that learning takes places through social interaction in a community. The notion of this social learning has profound educational implications particularly for suggesting the community cultures.

The term of communities of practices (CoP) is initially coined by Lave and Wenger (1991) as a model of social learning. The CoP was first based on the idea of apprenticeship model in a process called 'legitimate peripheral participation'. Most of their research focuses on the context of social setting and knowledge-sharing in practice. Wenger (1991) defined CoP by addressing the process of social learning in a shared space.

> *"Communities of Practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis"* (Wenger, McDermott, & Snyder, 2002, p. 4)

Brown and Duguid (1991) defined the picture of CoP that is a community of individuals who share the experience and knowledge very often informally in a variety of ways. Also, Lemke (1997) argued that the core of a CoP by this following explanation.

> *We gain the ability to do what we do. Our activity, our engagement, our "cognition" are always linked, co-dependent on the participation and the activity of other people, tools, symbols, process and objects. The way we are participating, the practices we embark on depending on that extensive community, or at least the part of the community with which we have joined. When we participate, we change. Our identity-in-practice develops. Within that framework, we are no longer autonomous individuals but individuals-in-activity* (p.38)

Those messages underlie the framework of CoP that argued for two fundamental aspects in CoPs are practice itself and articulation of knowledge in a community. First, practices here should be a more tractable characterisation in a historical and social context that gives structure and meaning, and it could be distinguished from less tractable such as activity,

general culture, or structure. Second, the community defines a particular type of community. Hence, Wenger *et al.* (2002) then extended the concept that the practice works as the source of coherence in a community, and it needs a commitment to a 'domain' to create a sense of accountability to a body of knowledge to expand the practice. To distinguish between what is CoP and what is not here is the following summary of the three crucial elements of CoPs (Wenger *et al.*, 2002):

1. *Domain.* A CoP needs an identity of a shared domain of interest (e.g. physicists, radiologist, middle school history teachers, etc.). It affirms the purpose, value, and meaning of their actions and inspires members to contribute and participate.
2. *Community.* The necessary component of a shared domain should be engaged in shared activities. Community plays a role as an essential element since the learning is a matter of belonging as well as the intellectual process.
3. *Practice.* Practices mean a set of framework, ideas, tools, language, stories and styles that community shares. While domain denotes the focus interest of a community, practice becomes a specific knowledge what the community develops, shares, and maintain. Thus, it enables a community can proceed more efficiently to deal with the domain.

The term of Community of Practice here differs from other structure. CoP refers to a specific type of social structure with a very

specific purpose. Its purposes are to build, extend, and exchange knowledge, and to develop individual capabilities. Indeed, some participants cared about the domain and aimed to develop it. This community accommodates an opportunity to learn new approaches and techniques in terms of specific desire to be perfect.

2.2. Science Classroom Culture as Community of Practice

Aikenhead (1997) stated that science could be seen as a cultural artefact. Science is situated and influenced by society and culture. Science is an acculturation process of some cultures (Maddox, 1981; Ogawa, 1998). By studying the socio-cultural dimension of science class, we can set insights into the different ways through which culture influence science teaching and learning. The structure of a classroom is not constructed by only the teacher in the classroom, but also by the students. It is evident, then, that classrooms as social fields in which teacher and student enact culture as practices.

Culture here can be understood as science culture, classroom culture, or even the country's culture itself. The cultural practices of people are structured by schema (including beliefs, values, and rules in teaching and learning), the availability of physical and human resources, and the way of human use these resources to meet their goals. Schema and structure exist in a dialectical relationship to one another within any field (Sewell, 1992; Park *et al*., 2015). The field means physical spaces or

social spaces held by individuals within a shared space (Bourdieu, 1986). It is consistent with CoPs theory by Lave and Wenger (1991) that discusses the knowledge sharing in practice and the workplace.

The idea of communities of practice has broadened considerably since it was popularized by Lave & Wenger (1998) and Brown & Duguid (1991). Most inquiry processes in science classroom carry out small group activities and include social attribute (e.g., discussion, argument, explanation). Thereby, CoP is expected to present a perspective to interpret and suggest for science classroom culture (Chun *et al.*, 2015). According to this study, three fundamental elements were expanded to be new five structural elements, particularly for the science classroom (see Figure 2.1)

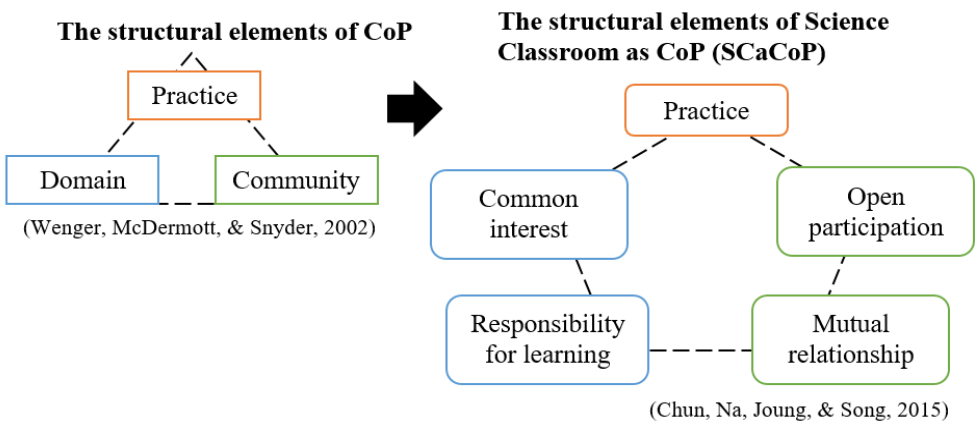


Figure 2.1. The expanded structural elements from CoP to SCaCoP

Those new expanded elements from CoP to SCaCoP above are explained in detail in Table 2.1. They were formulated into 27 indicators as

the main items on the SCaCoP instrument after analyzing literatures that already conducted a CoP study (Wenger *et al.*, 1998, 2002; Lee & Kim, 2008; Lee & Jeong, 2008; Kim, 2011; Jang & Kim, 2011; Oh & Park, 2012; Lee, 2012, 2013)

Table 2.1. The summary of expanding new set of SCaCoP for assessing science classroom cultures (Chun *et al*., 2015)

Initial elements	*New Set Elements*	*Indicators*	*Source of item*
Domain	Responsibility for Learning	Development of responsibility Mutual relationship Understanding responsibility Understanding main domain	Wenger (1998) Wenger et al. (2002) Lee & Kim (2008)
	Common Interest	Development of responsibility through sharing main domain Common purpose Reflecting Interest Common concern Progressing in mutual identity	
Community	Mutual Relationship	Confidence Friendliness Mutual trust Helping each other Sharing data	Wenger (1998) Wenger et al. (2002) Lee & Kim (2008) Lee & Jeong (2008) Kim (2011) Jang &Kim (2011) Oh & Park (2012) Lee (2012)
	Open Participation	Mutual participation Leading student to participation Distributed power Spontaneous participation Open adjustment Open communication Recognition of diversity Common participation	
Practice	Practice	Creating product Application of the product Practice style Democratic rule Evaluating rule	Wenger (1998) Lee & Kim (2008) Lee (2012) Lee (2013)

2.3. Trends in Indonesia

This section discusses the trends of socio-cultural studies, science education systems, and the students' performance in Indonesia. This information is offered to contextualize the problem that is being central to this research.

2.3.1. Previous research on science classroom climate

Previous results showed that socio-cultural studies on student perceptions of science classroom environment had been conducted in Indonesia. Results show that there were significant differences in students' perception of classroom learning environment between different groups of students, e.g., students in rural schools holding less favourable perceptions than students in urban and suburban schools (Wahyudi & Treagust, 2002). However, just small number of research in terms of socio-cultural studies has been conducted in Indonesia. It requires an investigation not only the learning environment but also the culture in practice which might be influenced by the diversity of cultures, languages and believes in Indonesia.

In addition, another international survey such as PISA 2015 result shows that Indonesian students perform a much higher index at 0.65 of motivation and engagement in learning science than on average across OECD countries at 0.02. A positive disciplinary climate in Indonesian classroom of science lesson is that the class is little noise and disorder, students listen to their teachers, and students start working just after the

lesson begins. TIMSS 2015 measuring fourth-grade class also reports that Indonesia is the first place of a high sense of school belonging and roughly 66% of the students reported they interested in learning science.

However, Indonesia usually shows very low, often the lowest results in academic performance in science and beliefs about nature and origin of scientific knowledge. PISA 2015 reports that Indonesia reached 403 points of science score below the OECD average at 493 (OECD, 2016; TIMSS&PIRLS, 2016). Those key findings affirm Indonesian educators to fix their strategy and instruction in teaching science since the high students' engagement and enjoyment during lesson could become the main advantages to promote the socially shared knowledge model in order to improve students' performances.

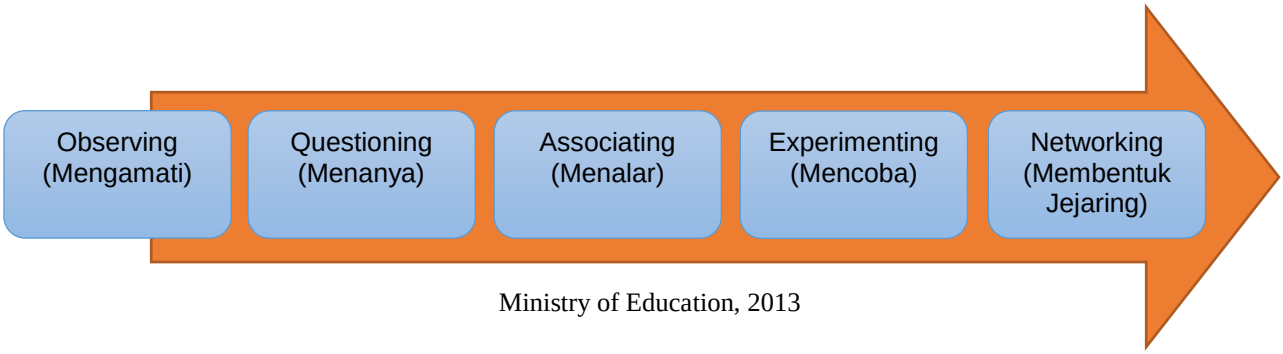
2.3.2. Overview of Indonesian Science Curriculum

Since a year ago, the government finally decided to implement the newly designed curriculum called '2013 Curriculum' after a couple of years trials. Curriculum 2013 is a form of an integrated work between the reconstruction of passing grade competence, sustainability and adequacy, expansion, advancement of the materials, learning revolution and evaluation reform. Indonesia's PISA score is a worrisome indicator for the rising middle-income nation seen as a leader in Southeast Asia. Hopefully, the changes embodied in the 2013 Curriculum serve to make students both

morally sound and intellectually competitive for the demands of the 21st century.

Of central importance to this curriculum is a change in teaching style. It pushes teachers to move away from the traditional teacher-centred classroom and towards a student-centred classroom. In real terms, this means that teachers are to spend less time lecturing students and more time teaching through inquiry. Teachers should facilitate the learning process by asking guided questions that help students discover content for themselves. Students are expected to become active and engaged learners. The new approach hopes to stir curiosity in students in order to build their critical-thinking and communication skills. (Ministry of Education, 2013)

In science learning particularly, the instructional activities are suggested to use a scientific approach that emphasizes personal experience through the process of observing, of questioning, of associating, and of experimenting to increase students' creativity. Moreover, students are to be familiarized to networking through collaborative learning (Ministry of Education, 2013). That central attention, then, were formulated to be 5M sequences in Indonesian language. Here is the following explanation about 5M of scientific approach.



Ministry of Education, 2013

Figure 2.2. The scientific approach sequences based on 2013 curriculum in Indonesia

In the process of implementing the scientific approach into the lesson, most teachers prepare the students' group discussion for executing those five steps. Students dominantly work with the group, not as individual. In addition, problem-based learning is applied as the powerful method in that inquiry process where students work in a team to solve the problem and develop curiosity.

2.4. Possibilities to assess SCaCoP elements to Indonesian Classroom

In short, scientific approach by 2013 Curriculum in Indonesia intentionally shapes the collaborative learning of students in a group or class. These group activities could be the shared activities of a concern, problems, or passion between students or between students and teacher, so-called CoP (Lave & Wenger, 1991). Thus, the scientific approach is practically consistent with how CoP works.

Because the concern of this study is about science classroom and the communities' cultures, SCaCoP elements were employed as the main

focus of this study. By SCaCoP, the community culture in Indonesian classroom, which has applied the scientific approach, is possible to be examined. Therefore, it can insight into different ways of cultural traits in Indonesian classroom as well as their impact on teaching and learning.

Chapter 3. Methodology

This study employed a multiphase mixed-method design in order to explore science classroom culture in Indonesian secondary schools. The study included both quantitative and qualitative data. This chapter describes the design of the study and methods of data collection and analysis used in this study. The context of the research settings is also described in order to help understand the characteristics of the current Indonesian science classroom.

3.1. Selection of Research Settings

The subject of this study were Indonesian students in science classes. This study was purposively focused on a small population from which a sample of schools and students were drawn. In order to draw meaningful cultural differences, several groups of students should become the dependent variables of this study. Thereby, the SCaCoP surveys were employed to different region (urban and suburban), gender (males and females), and levels of school (middle and high).

South Sulawesi was considered as representative of Indonesian in terms of location in the middle of Indonesia, diverse range of socioeconomic, and ethnic backgrounds (see Figure 3.1). Also, Indonesia Central Bureau Statistic (2016) reported that South Sulawesi is one of the provinces which have the big number of schools, teachers, and students. Those criteria met the requirements to gather data as the possible

representative of Indonesian schools.

In order to present different groups, this study took place in the urban schools located in Makassar and suburban schools located in Maros and Gowa. All schools were coeducational and had a relatively even mix of males and females. The 8th grade and 10th grade science class were main focus of this study.

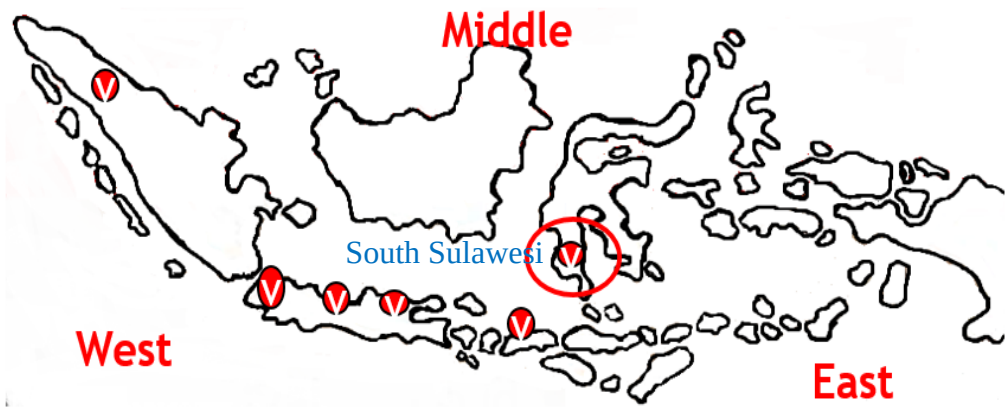


Figure 3.1. Geographical location of research in Indonesia

3.1. Context of Research Settings

This section describes the context in which the data was collected. The selected schools were founded as public secondary schools and located in two different types of areas. Those schools are mixed-gender schools and are implementing the 2013 Curriculum. The scientific approach was applied mostly to group discussion. At the beginning of the lesson, students already knew their group peers and immediately sat at their place.

Also, the selected schools were considered the representativeness of Indonesian schools. Their students' performances were around the average,

not the gifted schools nor lower track schools. The schools, either urban or suburban, are representative of each cluster. Moreover, the schools consisted of students from different cultures, mother tongues, and religions. It made the data be varied in terms of students' cultural background.

3.3. Ethics

In this study involving direct contacts with minors, the Institutional Review Board (IRB) of Seoul National University monitored all the procedures, including teachers and parental consents, student assent processes, and data collection. All the possible ethical issues were orally explained to the teachers and students, and all the required documentation were provided to students, parents, and teachers before commencing this study. In accordance with the guidelines for conducting ethical research, pseudonyms for the names of the schools and all participants were used in this study. The risks anticipated for participating in this study are expected to be minimal. All subjects were informed that, if they feel uncomfortable in answering any question during the interview, they may choose to pass the question with no penalty. Data is to be kept by researcher. The SCaCoP data was coded without identifying the participants' name. All audio recordings were transcribed and anonymized first. Then, the original recordings were safely deleted. Since video recordings include teachers' and students' faces, the recordings have been secured with a password throughout the whole stages of the research. All recordings are to be safely deleted immediately after this research is

finished.

3.4. Data Collection

Here the data collection is explained according to two phases (i.e., quantitative and qualitative).

3.4.1. Quantitative Method

The quantitative method was designed for the first stage of explanatory analysis eliciting students' perspectives. The method was conducted to a big number of data, which provided statistical analysis results. This quantitative study helps for understanding the picture of science classroom cultures on the whole.

3.4.1.1. Instrument Development: Science Classroom as Community of Practice Questionnaire

As mentioned above, this study is aimed to track the classroom culture that occurs in learning and teaching science through interpreting the perspectives of communities of practices. Science Classroom as Community of Practice (SCaCoP) questionnaire by Chun, et al., (2015) were employed to explore science classroom culture. SCaCoP has been tried to examine the science classroom culture in several countries. However, there has been yet no official reports from the countries except Korea.

In this study, SCaCoP was chosen as the main tool to be used for data collection for three reasons. First, this questionnaire is suitable for secondary schools; second, it has been proven to be a reliable questionnaire

for assessing classroom culture; and third, all statements are non-threatening. SCaCoP consists of five structural elements as shown in Table.3.1. SCaCoP includes 27 questions with a five-point Likert Scale (ranging from score 1 for strongly disagree to score 5 for strongly agree). This study would be the first to investigate these association specifically in science classrooms in Indonesia.

Table 3.1. Descriptions of the scales of SCaCoP (Chun et al., 2015)

Factors	Item number	Measurement item
Responsibility for learning	1	Development of responsibility
	3	Mutual relationship
	4	Understanding responsibility
	5	Understanding main domain
Common Interest	2	Development of responsibility through sharing main domain
	6	Common purpose
	7	Reflecting interest
	8	Common concern
	9	Progressing in mutual identity
Mutual Relationship	10	Confidence
	11	Friendliness
	12	Mutual trust
	13	Helping each other
	15	Sharing data
Open Participation	14	Mutual participation
	16	Leading student to participation (teacher)
	17	Distributed power
	18	Spontaneous participation
	19	Open adjustment
	20	Open communication
	21	Recognition of diversity
	22	Common participation
Practice	23	Creating product
	24	Application of the product
	25	Practice style
	26	Democratic rule
	27	Evaluating rule

3.4.1.2. Translation process of SCaCoP questionnaire

Because the original instrument was designed for Korean and Western students, with all statements in both Korean and English, careful translation and back translation as suggested by Brislin (1970) was carried out for Indonesian. Initially, SCaCoP questionnaire was translated into Indonesian by the researcher who is an Indonesian. The next step was an independent back-translation of the Indonesian version into English again by an individual who did not participate in the original translation. Regarding the item wording, the interviews with three middle school students and three science teachers in Indonesia were conducted to ensure that the Indonesian version was clear and understandable. These students and teachers considered the questionnaire to be simple, clear, non-threatening. Taken as a whole, this pilot checking suggested that the questionnaire was acceptable to be used for the main data collection in Indonesia.

3.4.1.3. Participants and Data Collection

For the data collection, a total of 1660 students from Indonesian secondary schools were surveyed with SCaCoP from March to May 2017. The students were selected from the 8^{th} and 10^{th} grade in urban and suburban schools. A multistage sampling or cluster sampling method was employed, which included three out of 24 districts in the South Sulawesi. Schools in these selected districts were categorized into urban and

neighbouring suburbs. In doing so, consultation with the Ministry of National Education of South Sulawesi was conducted to ensure the representativeness of the samples. As a result, the sample involved in this main study consisting of 972 students from 9 middle schools and 718 students from 6 high schools in Indonesia. The description of whole data is shown in Table 3.2.

Table 3.2. Description of the participants by grade level, region, and gender of Indonesian data (N=1660)

Schools	**School Locality**		**Gender**		**Classes**
	Urban	**Suburban**	**Boys**	**Girls**	
Middle school 1		√	37	61	5
Middle school 2		√	45	67	4
Middle school 3		√	40	74	4
Middle school 4		√	74	80	5
Middle school 5	√		43	73	4
Middle school 6	√		51	75	4
Middle school 7	√		22	41	2
Middle school 8	√		48	55	9
Middle school 9	√		35	51	3
High school 1		√	22	45	3
High school 2	√		39	58	4
High school 3		√	55	119	6
High school 4	√		41	108	5
High school 5		√	40	64	4
High school 6	√		50	47	4
Total			**642**	**1018**	**66**

3.4.2. Qualitative Method

The quantitative results were to be confirmed by qualitative analysis as a way of triangulating the data to portray a more accurate picture of this research. The motive of this qualitative method was to explore the reasons and more results than just SCaCoP survey's results. Furthermore, the features of science classroom culture based on the qualitative data are expected to answer the particular research questions about the trends of International survey results, why Indonesians performed a higher index of happiness and lower academic performance.

3.4.2.1. Classroom Observation

Classroom observation was carried out in the classes that can represent different areas and school levels, in total about four observed classrooms. For each urban and suburban, one classroom middle school and one classroom high school were selected. Classroom observation was conducted during science lesson in July 2017.

In doing classroom observation, before each class began, students were asked who are willing to be recorded on the camcorders. If all of the students agree, a whole class was recorded. However, if not all students in the class agreed with video recording, this observation was conducted to just some of them considering the seat, angle, and their learning method. The camcorders recorded in one direction of student's seat, rearranging those seats for students who agree to be recorded. Students who were not willing

to participate were placed on the left or right side of class. It is expected that all cameras did not record them. Yet, all the students in the selected classrooms agreed to participate in this study. Then, I freely set the camcorders on any sides to take the best pictures for further analysis.

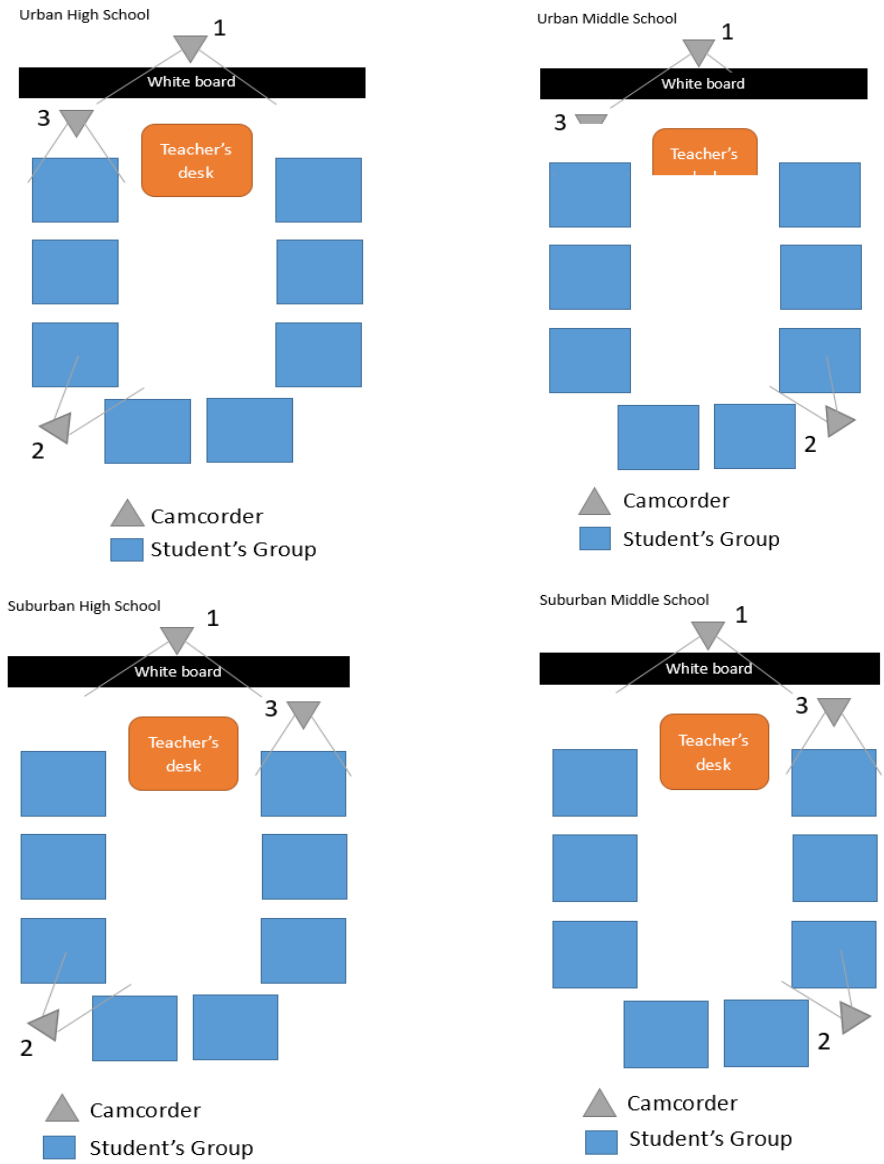
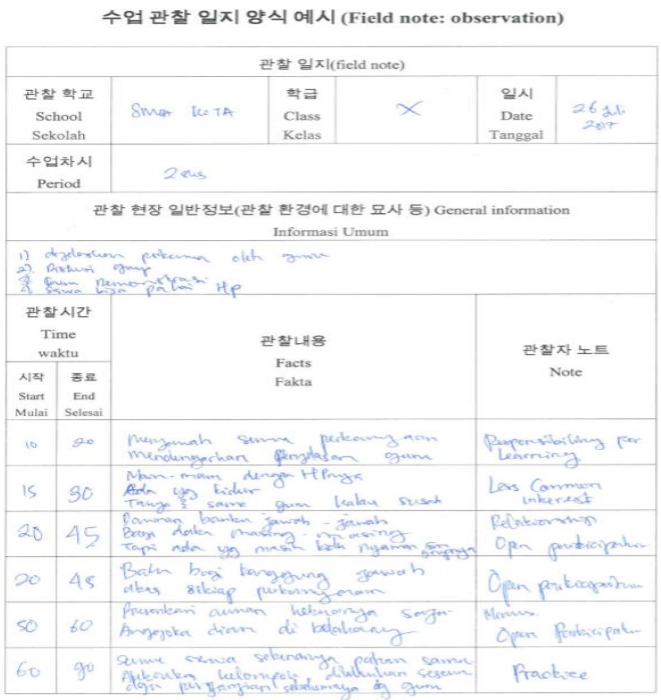


Figure 3.2. The settings of camcorders for classroom observation

Three camcorders were set for recording (see Figure 3.2.). Technically, one small GoPro camera was set above the whiteboard to record the whole class inside from the front easily, one camera was set behind the students, and the last one to track one group activities during a science lesson.

3.4.2.3. Field Notes

Field note assisted in describing general culture patterns (i.e., student's engagement, participation, responsibility for learning, interest in learning, etc.) and some notes to examine the video. Figure 3.3 shows the field notes that were used during the research. All of the information was written in Indonesian mostly to describe the observation in more detail.



수업 관찰 일지 양식 예시 (Field note: observation)

관찰 일지(field note)					
관찰 학교 School Sekolah	Smpn 1 Kota	학급 Class Kelas	X	일시 Date Tanggal	26 Juli 2017
수업차시 Period	2 kali				
관찰 현장 일반정보(관찰 환경에 대한 묘사 등) General information Informasi Umum					
1) dijelaskan pekerja oleh guru 2) Diskusi grup 3) Guru Memperhatikan 4) Siswa bisa pakai Hp					
관찰시간 Time waktu		관찰내용 Facts Fakta		관찰자 노트 Note	
시작 Start Mulai	종료 End Selesai				
10	20	Mengamati semua pekerjaan dan Mendengarkan penjelasan guru		Responsibility for Learning	
15	30	Main-main dengan HPnya Ada yg lidur Tanya2 sama guru kalau susah		Less Common interest	
20	45	Pamran bantu jawab - jawab Bagi dalam masing2 ada yang Tapi ada yg masih kata nyaman		Relationship Open participation	
20	45	Bakti bagi tanggung jawab akan sikap pekerjaannya		Open participation	
30	60	Presentasi aman kelompok saja Anggota diam di kelasnya		Monus Open Participation	
60	90	Semua sama seberapa pekan sama Aktivitas kelompok dilakukan secara Agar pekerjaan sesuai yg guru		Practice	

Figure 3.3. An example of Field Note Sheet

3.4.2.4. Interview

In addition to classroom observation, interviews with typical students from each observed classrooms were conducted. The interviews were planned to be conducted in the following weeks after the observations. Teachers were asked to select student who was the most representative students in the schools. The students were recommended by the teachers because they were to be at the medium level, good at socializing, can speak well, and are willing to be interviewed. However, it depends on who will be recommended by their teacher. On the other hand, teachers who taught the science during the observation were interviewed as well.

The post science lessons interviews were conducted during 30 minutes for students and almost 1 hour for teachers. It was conducted in person by face-to-face in a convenient place. Several questions were included to investigate some cultural structures (i.e., SCaCoP factors, general classroom climate, engagement, successful factors, and interest in learning science) from students' and teachers' perspectives. All interviews were conducted with audio or video recording to provide additional data. Examples of post-science lesson interview questions are shown in the Figure 3.4.

Student Interviews	Teacher Interview
(General question)	**(General question)**
How old are you?	How old are you?
Why did you choose science major? (for high school student)	How long have you taught science class?
(Specific questions)	**(Specific questions)**
Please tell me about your science class.	Please tell me about your teaching experience in science class
How was your class today? What parts did you like most?	How was your class today? What parts did you like most?
If you have any difficulties in class, please explain.	How was your student engagement?
How was your peer during the lesson?	How have you motivated students to like science?
What do you think helped you to be successful during this science lesson?	What do you think helped you to be successful during this science lesson?
What do you think may have prevented you fro being successful in this science lesson?	What do you think may have prevented you from being successful in this science lesson?
and others	and others
SCaCoP factors (students' comments)	SCaCoP factors (teachers' comments)
PISA&TIMSS Results (Students' comments)	PISA&TIMSS Results (Teachers' comments)

Figure 3.4. The interview's protocol for selected students and teachers

3.5. Data Analysis

3.5.1. Statistical Analysis

The quantitative data were analyzed in order to examine the reliability, validity, and factor structure of Indonesian data. In the questionnaire analysis, a statistical analysis was used. The percentage of students' positive answer was calculated and displayed in a frequency distribution table.

3.5.1.1. Validation of Indonesian Version of SCaCoP

The refinement and validation of SCaCoP involved a series of factor analysis in examining the internal structure of the set of 27 items. This sample sizes of 1660 students, according to Coakes & Steed (1999), was sufficiently large to allow meaningful factor analysis to scrutinize the internal structure of both versions of SCaCoP. A principal component factor analysis followed by varimax rotation (Gorsuch, 1983; Coakes & Steed, 1999) to get the most considerable amount of information resulted in the acceptance of the Indonesian version of the SCaCoP. The conceptual distinction of each scales was justified by the factor analysis.

Factor analysis results depicted in the Figure 3.5 which shows that all items of the five scales, except two items, have a satisfactory factor loading greater than or equal to 0.3 with their own scale. The factor loading for the Item 26 of Indonesian version was smaller than 0.3, and it had to be excluded. This item was fit to Open Participation scale than Practice scale as

hypothesized scale. In addition, item 14 and 15 had to be reviewed in which it was overlapping more than one scale.

Nevertheless, overall, this study provides support for the *a priori* five-factor structure of the final version; nearly all items have a factor loading of at least 0.3 on their a priori scale. For future use, item 14, 15, and 26 of Indonesian SCaCoP version need to be reworded in order to enhance the validity and reliability of the data. It is acceptable to maintain the 24 items of five scales for the further analysis.

	Scales				
	Open participation	Mutual Relationship	Responsibility for Learning	Practice	Common Interest
item19	.720				
item22	.701				
item20	.681				
item26	.675			-	
item21	.674				
item27				.347	
item23				.348	
item24				.381	
item16	.590				
item25				.359	
item18	.500				
item17	.497				
item13		.712			
item11		.698			
item15	.545	.652			
item10		.640			
item12		.623			
item14	.448		.572		
item4			.752		
item1			.706		
item5			.675		
item3			.600		
item9					.709
item8					.628
item7					.585
item6					.644
item2					.598

Loading smaller than 0.3 excluded
N=1660, 15 Schools

Figure 3.5. Factor loadings for the Indonesian version of SCaCoP

3.5.1.2. Reliability Analysis

In order to perceive whether or not each item can differentiate different classrooms, Cronbach's alpha method was applied towards 1660 students from 15 schools in Indonesia. The internal consistency reliability (Cronbach alpha coefficient) was 0.892 in average for 27 SCaCoP's items. On the whole, the statistics obtained were acceptable. Relative to the result of the initial validation (Chun et al., 2015), the internal consistency indices produced for the sample of this Indonesian study were similar. Table 3.4 shows that, for this sample of students, the alpha coefficients ranged from 0.73 to 0.81 of 5 scales, suggest that each SCaCoP scales have acceptable reliability, especially for scales containing a relatively small number of items.

Table 3.3. The result of Cronbach's alpha

Factor	**Number of items**	**Cronbach's alpha**
Responsibility for Learning	4	0.81
Common Interest	5	0.80
Mutual Relationship	5	0.78
Open Participation	8	0.74
Practice	5	0.77
Total	**27**	**0.89**

3.5.1.3. Comparative Analysis

The comparison between different groups (i.e., grade, gender, and school locality) was carried out by using independent-sample t-test analysis.

3.5.2. Qualitative Analysis

Both qualitative data (observation and interview) were analyzed with an inductive method to explore cultural structures that exist in the science classroom. If the findings from all methods draw similar conclusions, it will be able to affirm the validity of the analysis.

Specifically, the classroom observation data was analyzed by describing the typical example of behaviours and conversation enacted by students following the SCaCoP elements. In an effort to describe and explain patterns of students' culture, the data representative of patterns that had identified across all the data was purposefully selected. To help for organizing the analysis, the standard of questions in SCaCoP were followed to describe the students' behaviours and conversation during lesson. See the Table 3.4 that demonstrates in detail the approaches to analysing the observation data. Consequently, the observation results were described by researcher's perspective of science classroom culture in the video recording. Furthermore, the interview results were transcribed first and brought it to a meaningful summary regarding several implications. The interviews were conducted to the selected small number of students

and teachers, so the results were drawn from the students' and teachers' perspectives qualitatively.

Table 3.4. The meaning, sample items, standard behaviour and conversation related SCaCoP elements

SCaCoP elements	**Meaning and Sample items of each element**	**Standard of behaviour and conversation**
Responsibility for learning	Do members share science subjects that science class community seeks and have responsibility for their roles?	Do members concentrate on the discussion? Do members talk to each other about the contents?
Common Interest	Do science learning subjects on which communities concentrate reflect members' interests? Do members of communities share their common aims?	What are members doing? What do members want to do?
Mutual Relationship	Do group members feel a sense of belonging and intimacy, and give and take helps one another based on trust?	Do members talk to their members in friendly? Do members quarrel each other? Do members help each other?
Open Participation	Through community's activity do members produce, share and apply scientific knowledge and results? Do they make communities' unique class atmosphere or style, rules, assessment principles?	Do members talk to their members about their opinions? Do all members participate in group activities?
Practice	Whether members join in science class voluntarily and actively, do they can have open communication? Do teachers as one of the community's members help other members' even participation?	Can members understand about their activities? Do members sharing the knowledge

Chapter 4. Findings and Discussion

4.1. Quantitative Results

This section discusses the findings from the survey of students' perspectives about science classroom culture in Indonesia. The whole results from quantitative part generally represent the Indonesian trends statistically, and the data was compared to among different groups of students (i.e. genders, regions, and grades)

4.1.1. General Description of Indonesian SCaCoP results

In this section, the students' perceptions about science classroom culture in Indonesia are shown in the Table 4.1. The SCaCoP scores, then, is graphically displayed in the Figure 4.1.

Table 4.1. The SCaCoP scores

SCaCoP Elements	Mean	SD
Responsibility for Learning	3.94	.47
Common Interest	3.33	.46
Mutual Relationship	3.72	.58
Open Participation	3.90	.48
Practice	3.67	.51

Overall, by comparing the mean scores of each scales, it was found that Indonesian data were the highest in the Responsibility for Learning and Open Participation. These results indicate that Indonesian students were highly responsible for learning and more openly participate in a science

lesson. Mutual Relationship and Practice were perceived moderate by most students, but the mean score was just slightly less than the two highest elements. On the other hand, the Common Interest of students in learning science was the lowest among the five elements.

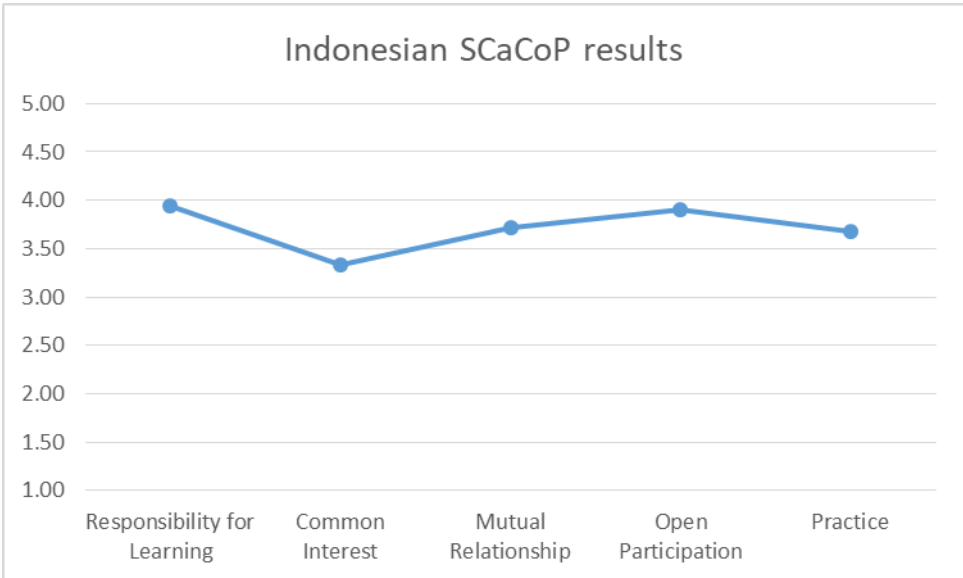


Figure 4.1. The results of Indonesian SCaCoP survey

In addition to the mean scores in each SCaCoP were analysed to investigate the differences in detail (see Figure 4.2). It was found that the biggest contributor to why Indonesian students were highly responsible for learning based on SCaCoP results, was students' good understanding about their responsibility (4)[①]**.** They need to make an effort in order to make the science classroom activities to be successful. Another one was that students understood well what the main domain (5), and why they should take the science class. Also, there are four items as the main contributors that picked

① The number indicates the corresponding items in the questionnaire (See Firgure 4.2)

the Open Participation scales as the highest one. Teachers' role (16) was perceived by students that could encourage all students to participate equally in class. Moreover, open adjustment (19), open communication (20), and common participation (22) also were perceived similar to the main contributing factors for Open Participation.

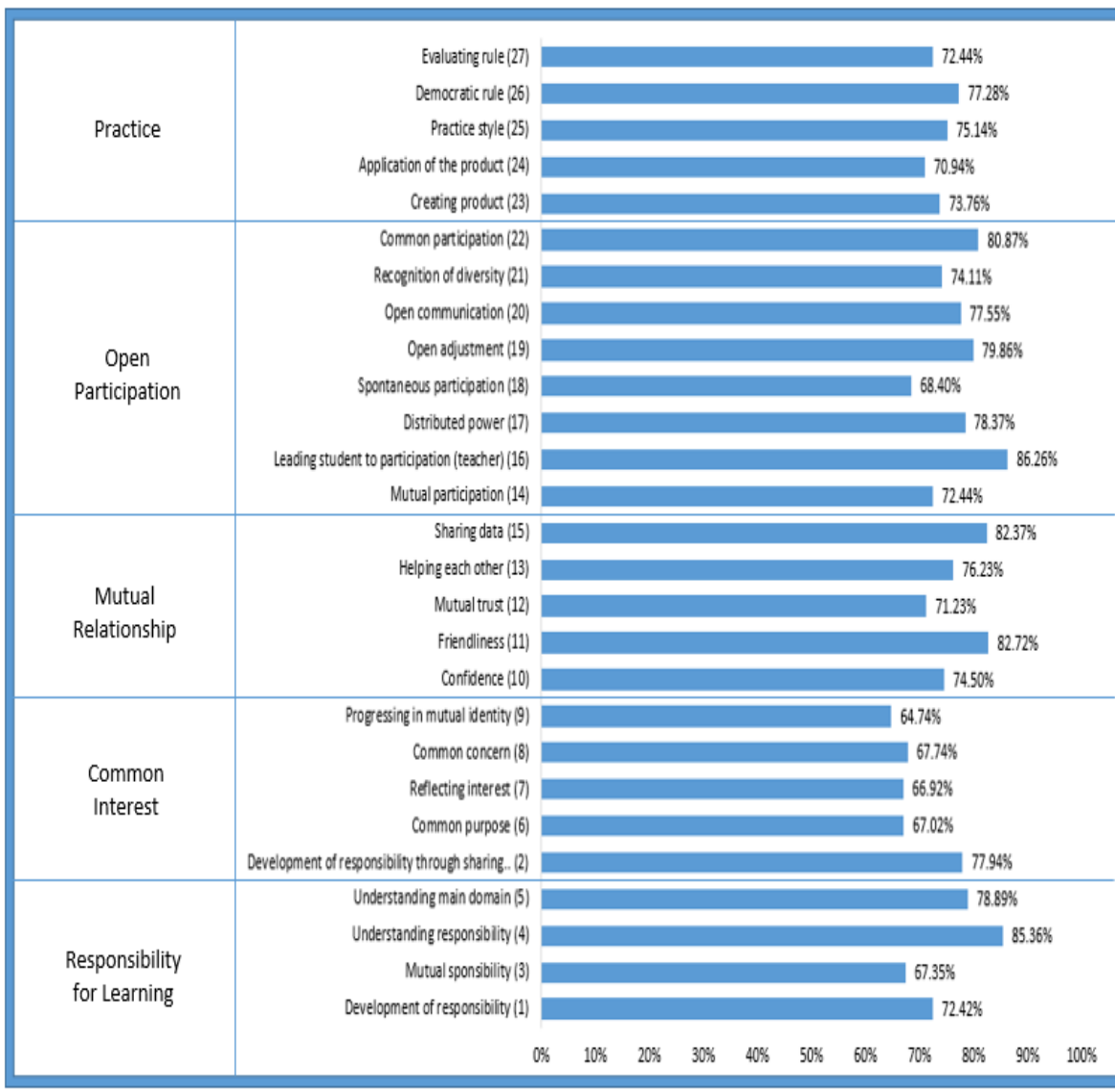


Figure 4.2. The analysis of SCaCoP items on the questionnaire

On the other hand, two items, friendliness (11) and sharing data (15), were found as the most contributing items to Mutual Relationship scale. Friendliness item was administered to suggest how close a student to others and SCaCoP results reveal that Indonesian students has good friendliness. Indonesian students perceived that they actively share their knowledge and materials to each other. Overall, it can be summarized that Indonesian students have a good relationship to each other in terms of sharing knowledge, concern, or problems.

In contrast to the other three scales that consists of several contributing items, Practice and Common Interest scales were found just consisting of one contributing item. For the Common Interest scale, development of responsibility through sharing main domain (2) was relatively higher than others, but it looks appropriate to the Responsibility factor because this item is placed at among responsibility items on the questionnaire. Lastly, the democratic rule item (26) was founded that it significantly contributes to the Practice scale score from Indonesian data. Democratic rule means that the rules in science class are decided not only by the teacher but also through discussion with all classmates. It seems that Indonesian teachers involved students to be successful in the science lesson.

4.1.2. Differences Between Genders

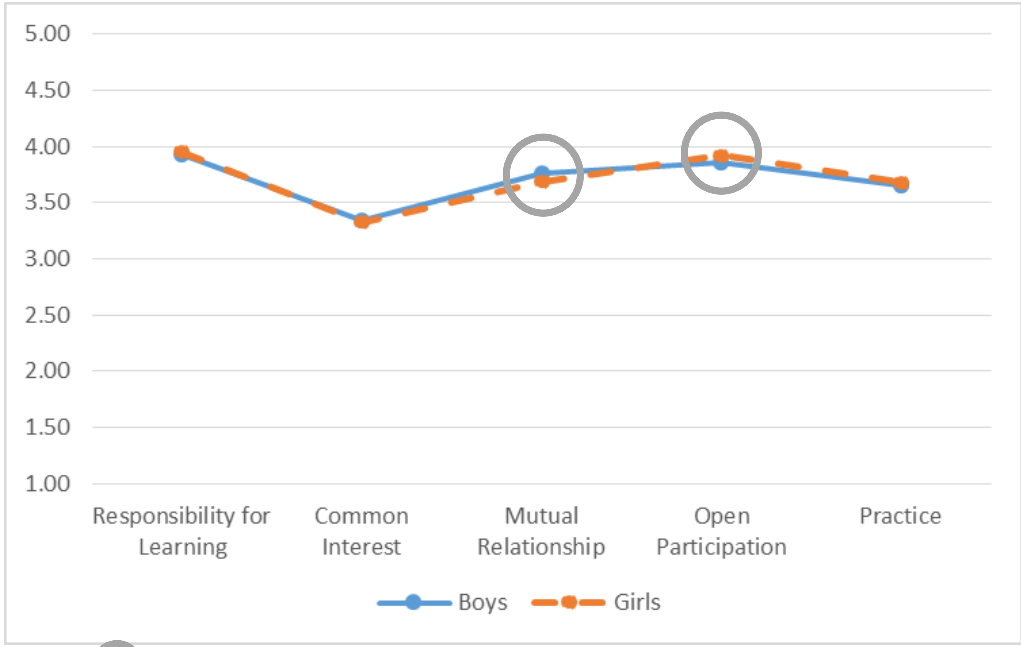
A part of tradition in cultural studies on learning is the investigation of gender differences (Hoftstede, 1986). The second step explored gender

differences in perceived classroom culture. The differences between genders are shown in Table 4.2 and Figure 4.3.

Table 4.2. Differences in students' perception of science classroom culture between genders

Scales	Indonesia		*p* - value
	Boys	Girls	
	M (SD)	M (SD)	
Responsibility for Learning	3.94 (0.47)	3.95 (0.47)	.538
Common Interest	3.34 (0.47)	3.33 (0.45)	.474
Mutual Relationship	3.76 (0.59)	3.69 (0.57)	.015*
Open Participation	3.86 (0.51)	3.92 (0.47)	.006**
Practice	3.66 (0.53)	3.68 (0.51)	.361

*p < 0.05, **p< 0.01



Note: ○ statistically significant difference, p < 0.05

Figure 4.3. The differences in SCaCoP results between genders

The general pattern of the data shows that there are statistically significant differences ($p < 0.05$) between boys' and girls' perception regarding Mutual Relationship and Open Participation. The data illustrate that girls have slightly higher score than boys regarding Responsibility for Learning, Open participation, and Practice, while boys have slightly higher score in the Common Interest and Common Relationship.

4.1.3. Differences Between School Localities

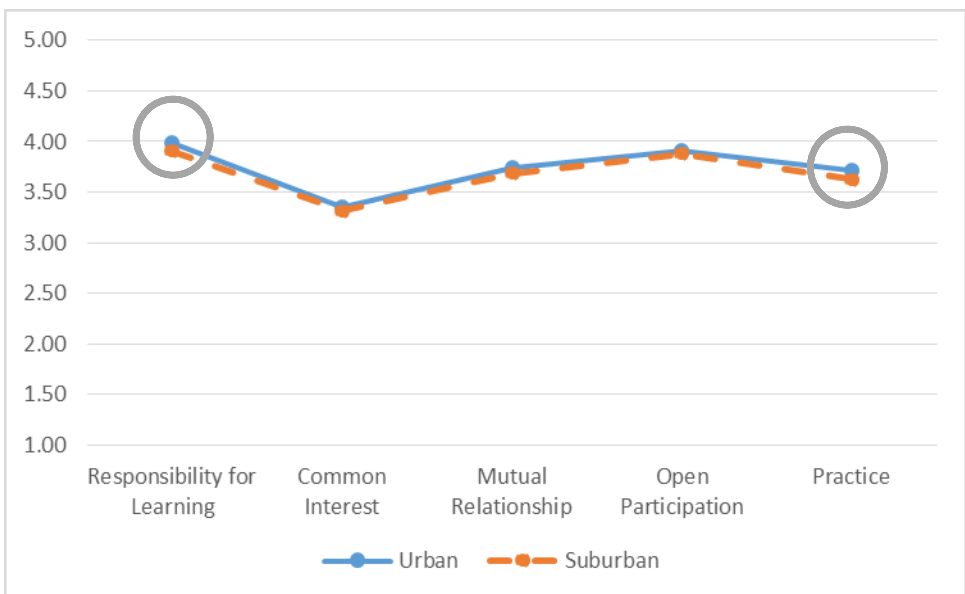
The third step compared between two regions in Indonesia, urban and suburban. The previous study reveals that students background from different populations were entirely different in ethnicity (Cracken, J.D & Barcinas, 1991). Based on the result of examining differences between two school localities, there is a significant difference in Responsibility and Common Interest scales between urban and suburban areas. Table 4.3 shows result of t-test comparison. Students in the urban schools viewed their culture in the classroom as having better Relationship and Practice rather than students in the suburban schools.

Table 4.3. Differences in students' perceptions of science classroom culture based on schools' localities

Scales	Indonesia		*p* - value
	Urban	Suburban	
	M (SD)	M (SD)	
Responsibility for Learning	3.98 (0.49)	3.90 (0.44)	.000**
Common Interest	3.35 (0.46)	3.32 (0.46)	.148
Mutual Relationship	3.74 (0.58)	3.69 (0.58)	.055
Open Participation	3.91 (0.49)	3.88 (0.47)	.167
Practice	3.72 (0.53)	3.62 (0.49)	.000**

*p < 0.05, **p< 0.01

Comparing by mean scores, the data indicate that urban school students scored higher in all SCaCoP scales than suburban. However, the size of the differences were very small between urban and suburban schools. Figure 4.4 provides the mean scores results graphically for the five SCaCoP scales from urban and suburban data.



Note: ○ statistically significant difference, p < 0.05

Figure 4.4. The differences in SCaCoP results between regions

4.1.4. Differences Between School Levels

The comparison between grade levels, i.e., 8th grade and 10th grade, were also examined. The results are shown in Table 4.4 and Figure 4.5. In this study, significant differences between grades were found in terms of Mutual Relationship, Open Participation, and Practice. 10th grade students were found to have better relationship and participation in learning science as well as doing better practice than 8th grade students.

Table 4.4. Differences in students' perceptions of science classroom culture based on grade level

Scales	Indonesia		*p* - value
	10th grade	8th grade	
	M (SD)	M (SD)	
Responsibility for Learning	3.93 (0.46)	3.96 (0.48)	.228
Common Interest	3.34 (0.47)	3.32 (0.44)	.564
Mutual Relationship	3.77 (0.58)	3.63 (0.56)	.000**
Open Participation	3.92 (0.49)	3.86 (0.46)	.007**
Practice	3.70 (0.52)	3.63 (0.51)	.017*

*p < 0.05, **p< 0.01

Furthermore, grade 10 students scored higher in all SCaCoP scales except Responsibility for Learning. However, the score for Responsibility scales showed little difference between the grades.

Note: ◯ statistically significant difference, $p < 0.05$

Figure 4.5. The differences in SCaCoP results between grades

4.1.5. Summary and Discussion

The overall findings reveal that Indonesian students achieve high scores in Responsibility for Learning, Open Participation, Relationship, and Practice elements, while getting low scores in Common Interest. In addition, there were some significant differences in terms of genders, grades, and school localities. In what follows, the summary and implications of these results are discussed.

In general, Indonesian students are good in responsibility for learning science. It means that Indonesian students indeed want to be serious in learning science. However, they still lack of interest to learn

science for several possible reasons. Significantly, this problem should be paid more attention by teachers, schools, and educational policymakers in how to provide an effective lesson for science to be more interesting and meaningful for students. Furthermore, the higher scores in Mutual Relationship and Open Participation suggest that Indonesian students had a good engagement in shared activities that would make students feel helpful and enjoy the learning. Also, Practice is perceived quite good when compared to all scales' results that argued Indonesian students doing good in practice, but it still needs to be improved.

Apart from the general conclusion, this study also provide particular results based on the comparison between different groups of students. First, several SCaCoP scales showed substantial gender differences. Boys are better at Mutual Relationship while girls were more openly participate in learning science. These differences could be interpreted that in a classroom girls are dominant in participation such as answering the question and sharing opinions. It has been reported by National Science Foundation (2002) that the female participation in science have been increasing over the past 20 years. Women raised a greater percentage in science graduate students in 2004 than in 1994. On the other hand, in this study, boys are dominant in helping each other and being friendly to classmates, but they are still less in participating in lessons than girls. This disparities recommend to the teachers that they need to have an effective strategy how to organize a group discussion or

practical work in learning science which involve participation of both genders equally.

Third, significant differences were also reported in the Responsibility and Practice scales between different regions. Urban students scored higher than suburban students in all five SCaCoP scales, but the differences were only in a small amount. It might be influenced by the educational policy in each area. Also, the opportunities from the state aid might be different, which influence the availability the sources and supports for learning science. The cooperation between suburbs and urban city will come slowly and with more difficulty in the areas of government and education. Another possible reason is outdoor (nondesigned) environments that can foster social development and academic success (Hattie et al., 1997). For a particular science subject (e.g., biology), how students conceptualize scientific principles and ways of knowing can be influenced by the nature of environment where children grow up (National Research Council, 2009). The urban and suburban environment looks very close to each other, although both are in the different areas, so just small differences were found in this study.

Fourth, the comparison between grades (i.e. 8^{th} and 10^{th} grade) revealed several significant differences regarding SCaCoP results. Mutual Relationship, Open Participation, and Practice differed significantly, and 10^{th} grade students perceived more favourable for those scales than 8^{th} grade students. Some possible reasons might have influenced this result.

The degree to which students understand and describe their own classroom culture may not be the same between the two age groups. Another reason is that the increase of grade level make students' understanding about the domain of science lesson will increase as well. Also, the way science contents and activities are organized and presented in grades 8 and 10, so this might have influenced the results.

Overall, this study provides some useful data and insights through which we can understand what is going on inside the science classroom in Indonesia, and how similar and different science classrooms are in the different groups of students. While the quantitative analysis gives some information about the general patterns of classroom culture in Indonesia, other important questions (e.g. how each SCaCoP scales manifest and interact in a real classroom) still remain unanswered. To extend the understanding about Indonesian science classroom culture, a qualitative analysis was conducted subsequently after the quantitative analysis.

4.2. Qualitative Results

4.2.1. Patterns of Students' Behavior and Conversation related to SCaCoP Elements

The data from classroom observation was analyzed by describing typical examples of behaviours and conversations enacted by students following the SCaCoP elements. In an effort to describe and explain patterns of students' culture, this study purposefully selected the data representative of patterns that were already identified across all the data. Consequently, the further observation results from the perspective of science classroom culture in Indonesia was only drawn by the researcher. Results from classroom observation reflects researcher perspectives about science classroom culture in Indonesia based on SCaCoP.

4.2.1.1. Classroom A: Urban High School

This classroom consisted of 30 students who was studying physical measurements in the physics laboratory. The context of this representative urban high school was the science learning taught through first explanation by the teacher, and then student did group discussion. Interestingly, students used a smartphone for googling any information about the task. After a prior explanation by the teacher, teacher gave students a group worksheet, and it guided students to do 5M of the scientific approach. By analyzing the video, the perspectives related SCaCoP behaviour during science lesson were drawn by researcher. Here

are the following indicators of students' culture based on SCaCoP. The example activities in the representing student activity are displayed in Figure 4.6.

A. Responsibility for Learning

Most students concentrated on the discussion; they were doing discussion actively with other members. Each group tried to answer all questions in the worksheet given by teacher because they will present their results to other groups in the last.

B. Common Interest

Most members were doing discussion following the teacher's instruction. However, some students complained some difficulties when looked at the question in the worksheet.

C. Mutual Relationship

Even all groups were actively discussed with each other; some students were not interested in group discussion. One looked like answered the task by herself, one slept on the desk, and one group often discussed other things about what they found since a smartphone can be used during learning.

D. Open Participation

In the two groups which have fully observed, they were talking their opinions and tried to conclude. Overall, just one group did a different job to each member to minimize the time-consuming.

E. Practice

Most members understood the activities and doing sharing ideas, but sometimes they asked the teacher about their answer, but teacher avoided to answer directly. Teacher leads students with some clues.

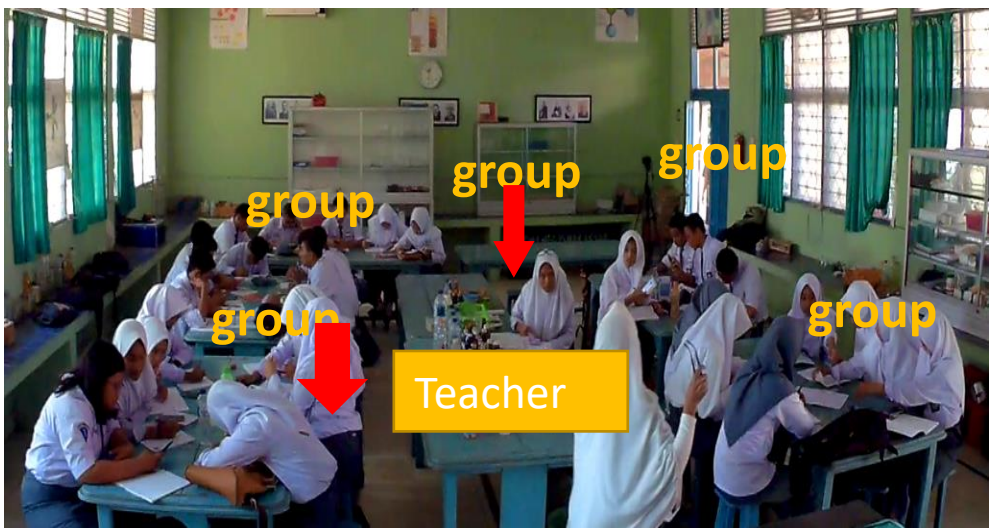


Figure 4.6. Classroom scene at the urban high school

4.2.1.2. Classroom B: Urban Middle School

The context from this representative schools was quite similar with classroom A, except for using a smartphone during the lesson. This classroom consisted of 28 students who was studying biology during observation. Here are the following indicators of students' culture based on SCaCoP. The example activities in the representing student activity are displayed in Figure 4.7.

A. Responsibility for Learning

Students in the class showed different actions during lesson. Sometimes they focused on doing their group task, but sometimes they did not. One group members played another thing while teacher visited another group, but there was one member still concentrated on the task.

B. Common Interest

Most members were doing discussion following the teacher's instruction. However, some students complained when looked at the question in the worksheet.

C. Mutual Relationship

Two observed groups were totally different. The boy's group did not discuss the task seriously; they were chatting except one student. On the other hand, the girls were doing the group discussion very active, they helped to each other for finding the answer, and they conclude all answers to make one conclusion.

D. Open Participation

The girl's group talked about their opinions and tried to conclude all opinions. Overall, they were doing better. Boys group, then, did active discussion after the teacher came to them again. However, all groups were good at the presentation and discussion with other groups.

E. Practice

Most members understood the activities and doing sharing ideas, except the boy's group.

Figure 4.7. Classroom scene at the urban middle school

4.2.1.3. Classroom C: Suburban High School

This classroom consisted of 21 students who was studying physics during observation. The context of this representative suburban high school was almost same with the previous classrooms, but teacher provided a simple science experiment to the students after group discussion. Therefore, this video recording provided a different student's activity from previous videos. Here are the following indicators of students' culture based on SCaCoP. The example activities in the representing student activity are displayed in Figure 4.8.

A. Responsibility for Learning

Most students concentrated on the discussion; they were doing discussion actively with other members. Each group tried to

answer all questions in the worksheet given by teacher because they were asked to present their results to other groups at the end.

B. Common Interest

Overall, most members were doing discussion following the teacher's instruction. However, they more interested in working together when experimenting rather than just doing discussion to answer the task.

C. Mutual Relationship

All groups actively discussed and shared the ideas/opinions without any quarrel. In the end, they made one conclusion together.

D. Open Participation

Most members were active in sharing their ideas with others. However, there were still one or two passive students during discussion. Also, during the presentation, just the leader of the group explained all conclusions, other members were passive.

E. Practice

Most members understood their activities well. However, sometimes they asked teacher about their answer, but teacher avoided to answer it directly. Teacher guided students with some clues how to answer their group's task.

Figure 4.8. Classroom scene at the suburban high school

4.2.1.4. Classroom D: Suburban Middle School

This classroom consisted of 25 students who was studying biology. This representative suburban middle school was not in an effective condition during observation. Some students were absence because they should participate to the school competition in outside classroom. The picture from this classroom might become a special case for this study. Here are the following indicators of students' culture based on SCaCoP during the classroom observation. The example activities in the representing student activity are displayed in Figure 4.9.

A. Responsibility for Learning

Just some groups concentrated on the discussion; other groups were lazy and did something else when the teacher did not

check their group. However, there was one boys' group who were doing good during the whole discussions time.

B. Common Interest

By looking at all groups, just one group were really interested in group discussion. Other groups show that not all members participated in the group discussion.

C. Mutual Relationship

Actually, some groups were doing discussion, but not all members participated in the group discussion. Some students did the group's task by themselves.

D. Open Participation

Some students were passive in the whole discussion, and they did not do anything such as asking a question or help others.

E. Practice

Most members understood their activities. However, some students were very lazy to do group discussion that is why not all member actively participated in sharing knowledge during the discussion.

Figure 4.9. Classroom scene at the suburban middle school

4.2.2. Factors Affecting Science Classroom Culture and Achievement

To describe this part, the transcribed data from the interviews was analyzed by summarizing the meaningful implications about SCaCoP and beyond the SCaCoP results. The interviews were conducted with a selected small number of students and teachers, so the results describe the perspectives of students and teachers in-depth.

4.2.2.1. Students' Perspectives

The interviews have been conducted with six representative students from middle schools and six students from high school students. The summary of patterns what students perceived about science classroom culture and its implication related achievement are described in these following composite images.

A. Composite image of science classroom culture from middle school students' response.

[*Age*] Students who participated in this study aged 13-14 years old from 8th grade of middle schools. [*Reason to choose science major*] They did not have any option to choose science subject or not because they are in middle school grade. [*About science class*] They mostly perceived that the science class overall was good. However, some teachers need to improve their teaching method or strategy. [*Parts that they like most*] Discussion and presentation became the parts that they like most. However, the group member and teacher assistance influenced the result of the discussion. [*Difficulties during the lesson*] When it comes to face the difficulties in the class, they preferred to ask the peers first. However, if they could not answer, they ask teacher directly. [*How peers during lesson*] Most of their peers were cooperative. They did all the task together. However, sometimes they were doing something else such as talking out-of-topic discussion. [*Factor that helps to be successful*] They thought that the participation from all group members and teachers' method to control the discussion and laboratory activities would help them to be successful in the lesson. [*Factor that prevented to be successful*] On the other hand, they thought that if there is a member who tempts to chat out-of-topic the discussion while teacher visit other groups, it will disturb other member and influence the results of the discussion. [*SCaCoP factors*] Overall, they voted high for Responsibility for Learning's element because of the rules of the teacher during the lesson.

They voted low for Common Interest because not all contents can be understood, particularly for physics problems. Mutual Relationship was voted high because all classmates were friendly and cooperative in working with the group. Open Participation was voted high because most classmates were actively participated in working by group. Practice was moderate because almost all science teachers applied the same method for the discussion. [*PISA & TIMSS*] They mostly answered 'happy' in learning science like PISA&TIMSS results. Their peers were very cooperative and kind to answer the task together. There was no individual pressure when teacher gave the task by group. However, teacher needs to be creative to provide an interesting science lesson.

B. Composite image of science classroom culture from high school students' response.

[*Age*] Students who participated in this study aged 15-16 years old from 10^{th} grade of high schools. [*Reason to choose science major*] They can get into the science major because of the test results. When the science score was relatively higher than other social science subjects, they will be prioritised to be science students. [*About science class*] They mostly perceived that the science class overall was good as like middle school students' answers. However, some students need to keep quiet and focus on the learning. [*Parts that they like most*] Discussion, experiment, and presentation became their most favourite parts of the learning sequences. [*Difficulties during lesson*] If

students were facing the difficulties in the class, they preferred to ask the peers first. However, if they could not answer, they ask to the teacher directly. [*How peers during the lesson*] Most of their peers were cooperative. They did all the task together. However, several students were very lazy for other science subjects. [*Factor that helps to be successful*] The participation of all group members, members' attitude, individual motivation, and teaching method will help them to be successful in the lesson. [*Factor prevented to be successful*] On the other hand, they thought that if there is a member who tempts to chat out-of-topic discussion while teacher visits other groups, it will disturb other member and influence the results of the discussion. Also, when a topic should be learned through experiment, but the teacher did not prepare for doing that. Therefore, students could not get meaningful learning. [*SCaCoP factors*] They voted high for Responsibility for Learning's element because of the teachers' rules. Common Interest was voted low because not all contents can be understood, particularly physics and chemistry problems. Mutual Relationship was voted high because all classmate were friendly and did the same. Open Participation was voted high because most classmates are actively participated, share the ideas with each other, and they did together to find out one conclusion. Practice was voted moderate because the teaching method needs to be improved (especially for physics and chemistry). [*PISA & TIMSS*] They mostly felt happy in learning science like PISA&TIMSS results. Their peers were very cooperative and kind to do all the task together. Also, there was no

individual pressure when the teacher gave the task by the group. However, high school science subject are recommended to be taught through more experiment or project.

4.2.2.2. Teachers' Perspectives

In this stage, the interviews have been conducted with four representative teachers (2 middle school teachers and two high school teachers) who have been observed their classrooms. The summary of patterns what teachers perceived about science classroom culture and its implication related achievement are described in these following composite images.

A. The composite image of science classroom culture from middle school teachers' response.

[*Age*] teachers who participated in this study aged 30-35 years old. [*How long taught science*] They have taught science for 8 years and 13 years. [*Teaching experience*] They mostly enjoyed the class, but they need to be creative in teaching science particularly physics because not all students will be interested in solving its problems. [*Parts that teachers like most*] Teachers thought that they were very pleased when the student actively asked any question about the topic and sharing their ideas/opinions with other students. [*Student engagement*] Teacher thought that student engagement depended on the topic, learning method, and sometimes it was influenced by the participation of each group member. [*How to*

motivate students] Teachers preferred to give the example of science concept regarding everyday life to motivate students to learn science. [*Factor that might help to achieve learning goals*] Media and project-based learning was considered by teachers that might help to achieve the learning goals because students made a final product that could be one of meaningful learning in science. [*Factor prevented to be successful*] Teachers thought that still several students were lazy and always disturbed other members of the group who were concentrating on solving the task. [*SCaCoP factors*] Same as previous responses by students, Responsibility for Learning's element was voted high by teachers. The teacher thought that before the lesson begins, they orally explained the rules for the lesson, and students understood what they have to do. Common Interest was voted low because not all topics and problems can be understood well by students. Mutual Relationship was voted high since students have a good collaboration in doing activity during lessons although sometimes they are discussed out of the topic. Open Participation was voted high because students already knew the rules during group discussion which led them being active in the lesson. Practice was voted moderate because the teaching method still needs to be improved for particular topics or problems. [*PISA & TIMSS*] Teacher thought that student felt happy as though PISA & TIMSS announced because they can do anything in the school, and also all their friend do the same. In addition, the government recently has implemented a law regarding prohibition of doing abusive to

students when they do not want to study. Then, it becomes a big problem for teachers to achieve the learning goals.

B. The composite image of science classroom culture from high school teachers' response.

[*Age*] Teachers who participated in this study aged 40-56 years old. [*How long taught science*] They have taught science for 16 years and 29 years. [*Teaching experience*] They mostly enjoyed the teaching as the part of their life. They did their best to teach students to be smart students with good attitudes. [*Parts that teachers like most*] Teachers thought that they were very pleased when the student actively asked any question about the topic and sharing their ideas/opinions with other students. [*Student engagement*] High school teacher also thought that student engagement depended on the topic, learning method, and sometimes it was influenced by the participation of each group member. [*How to motivate students*] Teachers preferred to give the example of science concept regarding everyday life to motivate students to learn science as a part of life. [*Factor that might help to achieve learning goals*] Media, classroom climates, and the student behaviour in the group influenced the learning process in the group. [*Factor prevented to be successful*] Teachers thought that still several students were lazy and always disturbed other members of the group who were concentrating on solving the task. Also, sometimes some groups were very passive and not discipline during group discussion. Also, the contents of topics what teacher should teach was too much. [*SCaCoP*

factors] Responsibility for Learning's element was voted moderate because not all high school students were aware of what they need to learn. Common Interest was voted low because not all topics and problems can be understood well by students. Mutual Relationship was voted high since students have a good collaboration in doing activity during lessons although sometimes they are discussed out of the topic. Open Participation was voted high because students already knew the rules during group discussion which led them being active in the lesson. Practice was voted moderate because the teaching method still needs to be improved for particular topics or problems. [*PISA & TIMSS*] Same with middle school teachers' responses, the student felt happy as though PISA & TIMSS announced because they can do anything in the school, and also all their friend do the same. The government's rules, about the prohibition of doing abusive, even such little abusive, to students when they do not want to study, make teacher difficult how to make students who always disturb their friends to be serious to learn science

4.2.3. Summary and Discussion

The results of this qualitative investigation, based on perspectives by researcher, selected students, and teachers, portray an appropriate picture with quantitative results about SCaCoP. In the Responsibility for Learning, the rules by teachers make students getting pressure to be concentrate, focus, and do their assignments. Students understood their

responsibility to answer the task by group discussion.

(In the interview)
Researcher : How was your peers during lesson?
Student : So far they were cooperative. We answered the task together. Sometimes, we made a rule during discussion that one member should answer one question in the task. After that, we discussed all answer and prepare to share to other groups in front of class.

This group's rules enact each member responsible for answering their question first and share their answer to other members. Those behavior and discourse could reflect the elements of Responsibility for Learning.

Nevertheless, not all topic can be discussed well in the group. Several science subjects are considered difficult by students. Sometimes, they refuse to answer some questions if it is not easy for them.

(In the classroom observation)
Student A : I answer no. 1, and you answer no.2.
Student B : Ah, it's difficult. I can't answer. I want to answer no.1.
Student A : Don't take my question, you answer no.3
Student C : Hey! I will answer it. Choose another one.
Student B : It's difficult. Whatever! I will not answer that question.
Student C : I will ask to teacher what does that question mean. We should answer it, don't leave it

Answering the assignments through group discussion still could not pursue the Interest of learning science if there is a problem with difficult topics. Members actually want to study by group discussion because it might helpful to understand the lesson easily. However, teacher are recommended by students to be creative in preparing the assignments related to science concept such as applying everyday phenomena what students can imagine to help answering the question.

Most of students are good at the relationship to each other. In the group discussion, all members have high responsibility for learning, and they shared their ideas to each other, but sometimes they lack the interest of learning science because of the difficulties. Therefore, for this condition, some students just depend on the smartest member of the group to answer the questions. Also, some student feels that they can be motivated to be active in participating during lesson when all the members do the same.

Open participation is strongly influenced by the relationship factor among students. Most of students dominantly participate in sharing ideas or opinions related assignments and arrive at one conclusion in their group. However, in the final presentation when they shared their conclusion to whole groups in the class, just the leader of each group explained all the answer and response to any questions or suggestions from other groups. Other members are mostly passive at this stage.

Overall, students understood their activities. Also, they shared the ideas through group discussion. However, in the some conditions, some students were lazy, and it might influence all the members. Also, some assignments perceived difficult by students. Sometimes, they need to ask teacher during discussions. Teacher needs to evaluate every single question in the task to stimulate students to be more active in the thinking process and sharing ideas.

4.3. General Discussion on Features of Indonesian Science Classroom Culture

Having established a whole pattern by quantitative data, little differences between different groups of students, and describe the qualitative results, I turned to predicting the implications and relationship of most influential items by SCaCoP factors. It was found that approximately 10 items were considered as the main contributor to Indonesian trends. Most of those items comes from the scales which has a higher score than others (i.e., Responsibility for Learning, Mutual Relationship and Open Participation). This results figure out the trends of each scale from quantitative data and bring a connection to the qualitative data.

First, it was found that the understanding responsibility and main domain are the most contributor factors that make the score of responsibility as the highest one. Students understand that they need to make efforts to make their science classroom activities to be successful. Also, they understand why they should take science class. From the qualitative data, the rules in the classroom make students need to be focus on learning and do their assignments. Therefore, it can be seen as understanding any important aspect (responsibility, main domain, and the rules) related science lesson pursues student to be more responsible and to be serious in learning science.

Second, common interest element becomes the lowest aspect of Indonesian students. Quantitative data shows that just the only one item

becomes the crucial factor, development of responsibility through sharing the main domain, yet considerably appropriate to the Responsibility for Learning element rather than Common Interest element. Also, this item is placed at among responsibility items on the questionnaire. Qualitative data mentions another factor that make common interest from Indonesian students still low. It is because some topics of science were considered difficult by students. Teacher needs to motivate students to learn science such as applying everyday phenomena related science concept into the assignments.

Third, friendliness and sharing data were found as the contributor items why Indonesian students have good relationship score. Friendliness item was administered to suggest how close a student to others, and how they are sharing the concerns, problems, and solutions. Qualitative data confirmed that the proses of sharing data depends on the member behaviour in the groups. All members' attitudes are possible to influence group activities.

Fourth, Open participation becomes the highest one based on the SCaCoP results. Teacher's role, open adjustment, open communication, and common participation are being the main contributors for high score of Open Participation scales from Indonesian data. It is strongly influenced by the Mutual Relationship factor based on the qualitative results. Most of students dominantly participate in sharing ideas or opinions related assignments, and they arrive at one conclusion. However, not all students

were reported active in the final presentation where each group have to present their results to other groups. Thus, the teacher's role in leading students' participation could become the crucial factor how to make all members in the group can participate in explaining their conclusion or answering any response and suggestion from other groups.

Fifth, Indonesian students show the great togetherness in deciding any rules in science class and evaluate whether it has been performed as planned. These factors are the main contributors to Practice score. Indonesian score for Practice element is moderate which means that it needs to be improved especially for other items. Also, students need to be more productive in practice.

Finally, the science classroom cultures from this study draw several aspects that might reflect the cultural characteristics of Indonesia. However, it depends on the temporal changes and cultural characteristics of each region. In the same vein as these findings, it is true that social activities inside science classroom do reflect the cultural features of different levels temporal and spatial levels. It is difficult to determine any causal factors and relationship among the data of this study and other findings from previous studies unless the further ambitious and controlled studies are carried out.

Chapter 5. Conclusion

5.1. Summary

This is the first study to examine the cultural features by exploring the 'Communities of Practice' perspectives. This study provides some invaluable data and insights through which we can understand what is going on inside the science classrooms and how similar and different science classrooms are in Indonesia. The findings reflect not only the multi-layered on-going cultural landscape of society but also their continuous changes.

This study employed a multiphase mixed-method design in order to explore science classroom culture in Indonesian secondary schools. Classroom cultures of this study were drawn based on five expanded elements from CoP to SCaCoP. The elements of SCaCoP are Responsibility for Learning, Common Interest, Mutual Relationship, Open participation, and Practice.

The results from both quantitative and qualitative reveal that Indonesian students achieved relatively high scores for Responsibility for Learning, Open Participation, Mutual Relationship, and Practice elements, while Common Interest was performed as the lowest score. Students' understanding of the important aspect (i.e., responsibility, main domain, and the rules) related to science lesson encouraged students to become responsible and to be serious in learning science. However, some topics of science were considered difficult by students, and teachers failed to deliver

an effective lesson, making students less interested in learning science. The academic performance of Indonesian students is still lower than other countries.

Notwithstanding the low interest, Mutual Relationship and Open Participation of students were perceived high in the classroom. Friendliness and sharing data were found from the interview that would make Indonesian students good at relationship. Furthermore, open adjustment, open communication, and common participation were supposed to influence a higher score of Open Participation by Indonesian students in learning science. In short, Indonesian students had a good engagement in shared activities that would make students feel helpful and enjoy the learning. Lastly, Indonesian students were good at deciding and evaluating any rules of a science lesson, but they thought that they need to be more productive in practice. Educational implications were discussed in terms of social views on learning as well as their impact on teaching and learning science.

5.2. Limitations of This Study

There were some limitations in this study. Firstly, the researcher is not fluent in the Korean language which the original study about SCaCoP was written in Korean. It was hard to be able to read and understand deeply about all structures of SCaCoP.

Secondly, there were also some limitations in the quantitative method. Students' responses to questionnaires might lack trustworthiness. The

researchers assumed that most students would tend to respond to a long questionnaire in such a manner that reduced its credibility by giving answers without reading the statements first. Also, some biased homogeneity induced by the sampling technique may increase the chance of not detecting a culture based difference when it actually exists. In addition, some of analysis method for quantitative data might be lack since this study is very first investigation using SCaCoP questionnaire in Indonesia. This study could not become a large-scale of national study.

Thirdly, the data collection for qualitative study might have some limitation as well. This qualitative study consisted of a big number of selected participants in both classroom observation and interviews. To draw very qualitative results might be a challenging for author. It is hard to draw very specific insights based on the data rather than provide a composite image for each representative data. Also, every social circumstance is flexible and changeable as time goes by and not staying in one posture. It is hard to judge any accurate picture of classroom culture in Indonesia for a period of time.

5.3. Future Directions

Considering the limitation of this study, further research can be done by following this several directions. Firstly, the further research that employs this questionnaire for different subjects, countries and other levels of education is recommended in conjunction with efforts to disseminate existing research in this area and to improve Indonesian classroom culture. Secondly, SCaCoP instrument is expected to be useful not only for analyzing science classrooms from a community of practice but also for suggesting a desirable community of science classrooms. Thirdly, to understand the current situations more clearly, further explored such more qualitative studies than just classroom observation and interview are needed to look inside science classrooms as confirmatory analysis of this study.

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APPENDIX A. Survey Questionnaire

Kuesioner Mengenai Struktur Budaya di Kelas IPA

Tujuan dari kuesioner ini adalah untuk melakukan sebuah penelitian terhadap persepsi anda mengenai budaya di dalam kelas sains di Indonesia. Kuesioner ini telah dipakai oleh peneliti se-Asia Timur dalam mendeskripsikan budaya yang ada di kelas sains. Kuesioner ini membutuhkan waktu sekitar 15 menit. Untuk melindungi identitas siswa, peneliti akan menggunakan kode pada setiap lembar responden. Sehingga identitas anda tidak akan diketahui dan tidak akan disebar kepada pihak yang tidak berkepentingan. Terima kasih atas kerjasamanya.

- Petunjuk teknis
  Gunakan skala di bawah ini untuk mendeskripsikan persepsi anda terkait struktur budaya di kelas sains berdasarkan pengalaman anda. Isilah dengan kritis seberapa baik setiap statement berikut yang terjadi di dalam kelas sains. Kemudian lingkari pilihan nomor yang ada di dalam table.

	Sangat tidak setuju	Tidak setuju	Netral antara setuju dan tidak setuju	setuju	Sangat tidak setuju
Saya membantu siswa lain di dalam kelas	①	②	③	④	⑤

Sebagai contoh:

Conyoh berikut menanyakan apakah anda membantu siswa lain di kelas IPA dan apakah kamu 'sangat tidak setuju, tidak setuju, netral, setuju, atau sangat setuju' dengan pernyataan tersebut.

- Jika kamu "setuju" lingkari nomor 4 pada lembar kuesioner
- Jika kamu berubah pikiran dan memilih pilihan yang lain, beri tanda silang pada jawaban yang dianggap tidak benar kemudian lingkari jawaban yang benar
- Pastikan bahwa anda menjawab semua pertanyaan ini.

SEOUL NATIONAL UNIVERSITY

Sekolah:_____Tingkat:_____Kelas : _

Nomor Induk Siswa _____

Jenis kelamin : ☐ Perempuan ☐ Laki-laki

	Pernyataan	Sangat Tidak Setuju	Tidak Setuju	Netral antara Setuju dan Tidak Setuju	Setuju	Sangat Setuju
1	Saya antusias dalam pembelajaran IPA dan bertanggung jawab di kelas	①	②	③	④	⑤
2	Menurut saya, teman kelas saya antusias dalam pembelajaran IPA dan ikut bertanggung jawab di kelas.	①	②	③	④	⑤
3	Menurut saya, semua orang di dalam kelas perlu berusaha untuk ikut mensukseskan aktivitas pembelajaran IPA di dalam kelas	①	②	③	④	⑤
4	Saya paham mengapa saya harus mengikuti kelas IPA	①	②	③	④	⑤
5	Saat mengikuti kelas IPA, saya mampu membedakan mana hal yang penting dari hal yang kurang penting.	①	②	③	④	⑤
6	Ketika mengikuti kelas IPA, saya berpikir bahwa teman kelas saya mempunyai tujuan yang sama	①	②	③	④	⑤
7	Sebagian besar topik-topik pelajaran di kelas IPA adalah topik yang ingin saya pelajarari	①	②	③	④	⑤
8	Kami belajar tentang isu-isu yang penting berdasarkan minat kami di kelas IPA	①	②	③	④	⑤
9	Minat teman-teman kelas saya dapat mempengaruhi atau mengubah apa yang kami pelajari di kelas IPA	①	②	③	④	⑤
10	Teman-teman kelas saya merasa kelas kami sangat kompak dan bangga akan hal itu	①	②	③	④	⑤
11	Teman-teman sekelas saya sangat dekat dan saling mengenal satu sama lain dengan baik	①	②	③	④	⑤
12	teman-teman kelas saya percaya akan informasi dan materi yang mereka terima dari teman kelas saya yang lain	①	②	③	④	⑤
13	Teman-teman kelas saya saling membantu di kelas IPA	①	②	③	④	⑤
14	Saat kelas IPA berhasil, hal ini menguntungkan setiap siswa di kelas	①	②	③	④	⑤

	Pernyataan	Sangat Tidak Setuju	Tidak Setuju	Netral antara Setuju dan Tidak Setuju	Setuju	Sangat Setuju
15	Di kelas IPA saya, siswa –siswa aktif berbagi ilmu dan materi dengan siswa lain	①	②	③	④	⑤
16	Guru memberi semangat kepada semua siswa untuk berpartisipasi bersama-sama di kelas	①	②	③	④	⑤
17	Di kelas saya, siswa-siswa tidak hanya mendengarkan pendapat dari guru atau beberapa siswa saja, tetapi mereka juga menghormati opini dari semua siswa	①	②	③	④	⑤
18	Teman-teman kelas saya berpartisipasi secara antusias di kelas atas kemauan mereka sendiri.	①	②	③	④	⑤
19	Meskipun kami mempunyai pendapat yang berbeda di kelas IPA, kami menyelesaikan perbedaan itu melalui konsultasi dan diskusi	①	②	③	④	⑤
20	Teman kelas saya bebas untuk saling bertukar pikiran di kelas IPA	①	②	③	④	⑤
21	Kelas saya setuju bahwa berbagai macam kompetensi dan karakteristik yang dimiliki setiap siswa di kelas IPA	①	②	③	④	⑤
22	Dengan berpartisipasi bersama-sama di kelas IPA, kami secara berkelompok membangun pengetahuan dan menghasilkan hasil belajar	①	②	③	④	⑤
23	Teman-teman saya berbagi pengetahuan dan hasil akhir yang kami hasilkan bersama dengan siswa lainnya di kelas IPA	①	②	③	④	⑤
24	Teman-teman saya menerapkan pengetahuan dan pengalaman yang dipelajari di kelas IPA dalam kehidupan sehari-harinya di luar kelas	①	②	③	④	⑤
25	Kelas IPA saya mempunyai gaya belajar dan suasananya sendiri, yang berbeda dengan kelas lainnya	①	②	③	④	⑤
26	Aturan – aturan di kelas IPA saya, diputuskan bukan hanya oleh guru tapi juga melalui diskusi dengan semua anggota kelas	①	②	③	④	⑤
27	Kelas IPA saya mempunyai metode khusus untuk menentukan apakah pelajaran tersebut terlaksana sesuai rencana pembelajaran atau tidak	①	②	③	④	⑤

APPENDIX B. An example of consent form

IRB No. 1703/002-005 유효기간: 2018년 3월 12일

SEOUL NATIONAL UNIVERSITY

Pernyataan Persetujuan untuk Berpartisipasi sebagai Subjek Penelitian (orang tua/wali dan siswa)
Observasi Kelas

1.Nama Orang Tua : _____

2. **Judul Penelitian :** Studi struktur budaya kelas IPA di Indonesia dari perspektif 'community of practice (CoP)'

3. **Nama Peneliti :** Elwinda Dwi Pratiwi, Mahasiswa S2, Peneliti Utama
Jinwoong Song, Professor, Pembimbing Akademik

4. **Institusi :** Seoul National University, Korea Selatan

Pernyataan persetujuan ini boleh jadi mengandung informasi yang sulit untuk dipahami. Jika ada informasi yang belum jelas, silahkan kontak sdri. Elwinda Dwi Pratiwi. Nomor kontak akan ditulis dilembaran akhir form ini.

5. **Persetujuan Penelitian :** Dokumen ini terdiri dari beberapa informasi penting. Jika anda menandatanganinya, anda secara resmi akan dilibatkan dalam penelitian ini. Silahkan baca keseluruhan dengan teliti. Anda juga boleh menggandakan lembar pernyataan ini untuk didiskusikan dengan keluarga anda, pengacara atau yang lain sebelum anda menyetujuinya. Jangan menandatangani kecuali anda merasa aman untuk berpartisipasi dalam penelitian ini.

6. **Tujuan Penelitian :** Anak anda akan diminta untuk berpartisipasi dalam studi penelitian yang dilakukan oleh para peneliti dari Seoul National University dikarenakan anak anda adalah seorang siswa di sekolah yang telah ditunjuk sebagai perwakilan dalam survey penelitian struktur budaya kelas IPA di Indonesia.

Penelitian ini bertujuan untuk mengeksplor dan mengkaji lebih dalam struktur budaya dalam kelas IPA di Indonesia dari perspektif 'Community of Practice (CoP)'. Secara khusus, peneliti berusaha untuk menelusuri proses keterlibatan siswa dan guru selama proses pembelajaran IPA melalui observasi kelas, pengisian kuesioner, dan wawancara. Peneliti akan meminta guru dan siswa untuk menggambarkan pengalaman mereka tentang pembelajaran di kelas IPA. Penelitian ini akan berlangsung dalam 3 tahap.

Semua siswa yang ada di sekolah anak anda akan diminta untuk berpartisipasi dalam penelitian ini. Partisipasi anak anda bersifat sukarela dan dia dapat mengundurkan diri kapan saja. Anda dapat memilih untuk tidak mengikutkan anak anda dalam penelitian ini. Jika demikian, dia tidak akan direkam, disurvei, maupun diwawancarai dan tidak akan disebutkan dalam pelaporan penelitian ini.

5

7. **Prosedur :** Studi ini akan dilakukan dalam tiga tahap,

Tahap 1 (pengisian kuesioner),

- Peneliti akan menggunakan kuesioner yang disebut ScaCoP (Science Classroom as Community of Practice) yang terdiri dari 27 item pertanyaan.
- Tahap ini akan dilakukan pada bulan Maret ke April tahun 2017

Tahap 2 (Pengumpulan data melalui observasi kelas)

- Peneliti akan melakukan observasi dan pengambilan gambar pada 4 kelas IPA sebagai perwakilan/representative kelas.
- Jika anak anda berpartisipasi dalam observasi kelas, dia akan direkam dalam bentuk video (gambar dan suara).
- Tahap ini akan dilakukan pada bulan Juni ke Juli tahun 2017.

Tahap 3 (Follow-up wawancara),

- Peneliti membutuhkan paling sedikit 15 siswa dan 5 guru IPA untuk diwawancarai. Jika anak anda terpilih untuk diwawancarai, dia akan diberikan beberapa pertanyaan terkait pengalaman dan pendapatnya terhadap pembelajaran IPA.
- Interview ini didesain sebagai interview pasca pembelajaran sains, dan ini akan berlangsung singkat, paling lama 20 menit dan akan dilakukan secara tatap muka di tempat yang nyaman bagi anak anda.
- Tahap ini akan dilakukan pada minggu selanjutnya setelah tahap observasi kelas

Berikut adalah prosedur kami untuk melakukan penelitian. Akan tetapi untuk lembar persetujuan ini kita akan fokus pada tahapan ke-2 dimana anak anda akan diminta untuk berpartisipasi dalam observasi kelas selama pembelajaran. Kami akan melakukan observasi kelas dengan beberapa kamera untuk mengidentifikasi struktur yang mempengaruhi aktivitas siswa di kelas. Dalam observasi ini, peneliti hanya akan memposisikan kamera ke subjek yang bersedia untuk direkam.

8. **Resiko dan Ketidaknyamanan/Kendala:** Kecuali perasaan gugup atau malu saat pengambilan video di kelas selama survei,, tidak ada yang berpotensi membahayakan ketika menjadi subjek dalam penelitian ini. Rekaman anak anda tidak akan ditampilkan tanpa persetujuan dan izin terlebih dahulu. Jika anak anda merasa tidak nyaman menjawab pertanyaan, ia boleh memilih untuk tidak berpartisipasi dalam penelitian ini. Dia dapat mengundurkan diri kapan saja tanpa konsekuensi.

9. **Resiko yang Tidak Terduga:** Kemungkinan kerugian dan resiko yang bisa terjadi dalam penelitian ini tidak lebih besar dari yang biasa didapati dalam aktvitas sehari-hari siswa kelas 8 dan kelas 10 dalam kelas IPA secara normal di kelasnya. Walaupun demikian, partisipasi dalam studi apapun berpotensi mengalami resiko. Jika resiko yang tida terduga muncul, akan dilaporkan ke komite Bioetika IRB Seoul National University, Korea Selatan

10. **Manfaat:** Tidak ada manfaat langsung dari penelitian ini untuk anak anda. Tetapi dengan berpartisipasi, anak anda akan lebih peduli dengan budaya yang ada di lingkungan belajarnya khususnya kelas IPA. Kedepannya, kita berharap penelitian ini bisa menjadi tambahan informasi dan atau pertimbangan dalam pengambilan kebijakan dan pelaksanaan pendidikan.

11. **Prosedur Cadangan:** Anda dapat memilih untuk tidak mengizinkan anak anda untuk berpartisipasi dalam penelitian ini. Jika demikian, dia tidak akan direkam dan tidak ada referensi untuk dia yang akan dibuat dalam pelaporan penelitian ini.

12. **Alasan untuk Memberhentikan Responden:** Anak anda boleh jadi akan diberhentikan sebagai subjek penelitian untuk alasan apa saja dari pihak peneliti Seoul National University jika dianggap gagal mematuhi persyaratan yang diberlakukan selama penelitian (misalya anak anda pindah ke sekolah lain).

13. **Partisipasi Secara Sukarela:** Bentuk partisipasi dalam penelitian ini adalah sukarela dan jika anak anda memutuskan untuk berpartisipasi, dia dapat mengundurkan diri kapan pun. Jika dia memutuskan untuk tidak berpartisipasi dalam penelitian ini bukan merupakan faktor penentu pretasi belajar anak anda di sekolah.

14. **Upah/Penggantian Biaya:** Anak anda tidak akan menerima kompensasi apapun atas partisipasi anak anda dalam penelitian ini. Namun anak anda dapat ikut belajar mengenai aspek budaya yang diangkat dalam penelitian ini sebagai hasil dari partisipasi anak anda.

15. **Kerahasiaan:** Semua informasi yang dikumpulkan dalam penelitian ini akan disimpan dalam dokumen pribadi. Dalam setiap publikasi atau presentasi hasil penelitian, identitas anak anda tetap dirahasiakan. Semua rekaman suara akan dinaskahkan dan tidak akan diberi nama. Kemudian rekeman suara tersebut akan dihapus secara keseluruhan dengan hati-hati. Untuk data rekaman video yang memuat gambar guru dan siswa akan disimpan dengan aman menggunakan pasword pada suatu file tertentu. Namun, data ini akan segera dihapus secara keseluruhan setelah penelitian ini selesai. Hanya peneliti yang berwenang yang bisa mengakses data ini.

    Ada kemungkinan bahwa data ini akan diperiksa oleh pihak yang berwenang seperti dewan review kelembagaan (IRB komite) yang bertugas melindungi hak-hak dan kesejahteraan subjek penelitian, peneliti dapat memberikan akses catatan dengan mengidentifikasinya dengan kode. Untuk data ini, anak anda tidak akan diidentifikasi dengan nama.

16. **Pertimbangan Lain:** Jika anda ingin informasi lebih lanjut mengenai hak anak anda sebagai partisipan dalam penelitian ini, silahkan menghubungi Seoul National University IRB Committee at 82-2-880-5153 atau email ke irb@snu.ac.kr

    Jika anda memiliki pertanyaan tentang studi ini, partisipasi anak anda dalam studi atau terkait dokumennya, dapat menghubungi sdri. Elwinda Dwi Pratiwi (+8210-6572-3785 (Korea) atau +6285-255-714-140 (Indonesia) untuk membahas pertanyaan anda baik

lewat telepon atau pertemuan langsung di sekolah anak anda. Semua peserta dianjurkan untuk menghubungi sdr. Elwinda Dwi Pratiwi dengan pertanyaan apapun.

17. **Pemberhentian Penelitian** : Jika sewaktu-waktu penelitian ini diberhentikan, maka seluruh data yang telah terlanjur kami dapatkan akan dimusnahkan sesegera mungkin. Sehingga hal ini diharapkan bisa menjaga data partisipan dalam studi ini.

18. **Persetujuan:** Saya setuju untuk mengizinkan _____ sebagai subjek dalam penelitian ini.

- Saya telah mengetahui alasan penelitian ini
- Saya telah membaca petunjuk pelaksanaannya
- Semua pertanyaan saya terkait penelitian ini telah terjawab
- Saya telah membaca form pengajuan izin ini secara menyeluruh dengan teliti.
- Setelah menandatangani dan mengembalikan formulir persetujuan ini, saya akan menerima salinan formulir persetujuan sebagai arsip.
- Saya memberikan izin anak saya untuk menjadi partisipan.
- Saya memberikan izin anak saya untuk direkam

Untuk pernyataan izin orang tua, silahkan menandatanganinya pada lembar persetujuan siswa pada halaman berikutnya. Selanjutnya, mohon untuk menjelaskan kepada anak anda perihal penelitian ini jika mereka kurang memahami.

APPENDIX C. Classroom Observation Field Notes

수업 관찰 일지 양식 예시 (Field note: observation)

<table>
<tr><td colspan="6">관찰 일지(field note)</td></tr>
<tr><td>관찰 학교
School
Sekolah</td><td></td><td>학급
Class
Kelas</td><td></td><td>일시
Date
Tanggal</td><td></td></tr>
<tr><td>수업차시
Period</td><td colspan="5"></td></tr>
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Time
waktu</td><td rowspan="2">관찰내용
Facts
Fakta</td><td colspan="3" rowspan="2">관찰자 노트
Note</td></tr>
<tr><td>시작
Start
Mulai</td><td>종료
End
Selesai</td></tr>
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<tr><td></td><td></td><td colspan="3"></td></tr>
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<tr><td></td><td></td><td colspan="3"></td></tr>
</table>

APPENDIX D. Interview Protocol

Wawancara dengan pertanyaan terbuka (untuk siswa)

Naskah

PENGANTAR

Peneliti: *"Untuk wawancara ini, saya akan bertanya mengenai pengalaman kamu sebagai siswa yang menjadi subjek dalam penelitian ini. Survei ini bertujuan untuk mengkaji struktur budaya yang ada di dalam kelas IPA di Indonesia. Wawancara akan berlangsung sekitar 10-15 menit ke depan. Silahkan menikmati snack yang tersedia dan wawancara ini bersifat fleksibel.Jika kamu ingin beristirahat boleh meninggalkan ruangan ini. Kamu boleh menolak menjawab pertanyaan jika merasa tidak nyaman. Selain itu, jika kamu memutuskan ingin menghentikan wawancara ini silahkan memberitahukan kepada saya dan saya akan menghentikan wawancaranya. Sejauh ini apa ada yang ingin ditanyakan? Oke, mari kita mulai"*

BERTANYA

(Pertanyaan Umum)

1. Siapa nama kamu?
2. Sudah umur berapa sekarang?
3. Mengapa kamu memilih jurusan IPA? (untuk siswa SMA)

(Pertanyaan Spesifik)

4. Tolong ceritakan kepada saya tentang kondisi kelas IPA kamu.
5. Bagaimana kelas kamu hari ini? Bagian mana yang paling kamu suka/enjoy?
6. Jika kamu mendapati kesulitan, tolong jelaskan
7. Bagaimana teman sekelompok kamu selama pembelajaran?
8. Menurut kamu, apa yang dapat membantumu untuk mencapai keberhasilan (berprestasi) di dalam kelas IPA?
9. Menurut kamu, apa yang bisa menghalangi kamu mencapai keberhasilan di dalam kelas IPA?

   Dan lain-lain.

PENUTUP

Peneliti : " terima kasih atas waktu dan kesediaannya. Apakah ada komentar, pertanyaan atau masalah sejauh ini? Baik. Harap diingat bahwa anda memiliki kontak saya, jika butuh informasi terkait wawancara ini boleh menghubungi saya nantinya. Saya telah menyiapkan cendera mata untuk kamu sebagai ucapan terima kasih telah menjadi responden. Oke terima kasih atas waktunya!

Wawancara dengan pertanyaan terbuka (untuk guru)

Naskah

PENGANTAR

Peneliti: *"Untuk wawancara ini, saya akan bertanya mengenai pengalaman Anda sebagai guru yang menjadi subjek penelitian ini. Survei ini bertujuan untuk mengkaji struktur budaya yang ada di dalam kelas IPA. Wawancara akan berlangsung sekitar 10-15 menit ke depan. Anda dipersilakan untuk menikmati snack yang tersedia dan wawancara ini bersifat fleksibel jika Anda ingin beristirahat boleh meninggalkan ruangan ini. Anda dapat menolak menjawab pertanyaan jika Anda merasa tidak nyaman. Selain itu, jika Anda memutuskan Anda ingin menghentikan wawancara ini silahkan memberitahukan kepada saya dan saya akan menghentikan wawancara. Sejauh ini apa ada yang ingin ditanyakan? Oke, mari kita mulai"*

BERTANYA

(Pertanyaan Umum)

1. Siapa nama anda?
2. Sudah umur berapa sekarang?
3. Sudah berapa lama anda mengajar di kelas IPA?

(Pertanyaan Spesifik)

4. Tolong ceritakan kepada saya tentang pengalaman mengajar anda di kelas IPA.
5. Bagaimana kelas anda hari ini? Bagian mana yang paling anda suka/enjoy?
6. Sejauh apa keterlibatan siswa selama proses pembelajaran?
7. Bagaimana anda memotivasi siswa-siswi untuk menyukai pelajaran IPA
8. Menurut kamu, apa yang dapat membantumu untuk mencapai tujuan pembelajaran di kelas IPA?
9. Menurut kamu, apa yang bisa menghalangi kamu mencapai tujuan pembelajaran di dalam kelas IPA?

   Dan lain-lain.

PENUTUP

Peneliti : " terima kasih atas waktu dan kesediaan anda. Apakah ada komentar, pertanyaan atau masalah sejauh ini? Baik. Harap diingat bahwa anda memiliki kontak saya, jika butuh informasi terkait wawancara ini boleh menghubungi saya nantinya. Saya telah menyiapkan cendera mata untuk anda sebagai ucapan terima kasih telah menjadi responde ini. Oke terima kasih atas waktunya!